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The Effect of Hookworm Treatment
on the Hemoglobin Index.
An analysis of 2605 cured cases.

by

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I. INTRODUCTION.

This study was undertaken to evaluate the result of hookworm treatment as indicated by the hemoglobin content of the blood before treatment and after cure. A cure is understood to be the absence of hookworm ova in the stools after two treatments as disclosed by a thorough microscopic examination of the excreta eight days after the last treatment.

Considerable data has been published showing an increase of varying degrees in the hemoglobin following the treatment of hookworm. These reports are representative and give the facts as they were disclosed by the records of the respective areas. But it appeared to me that these reports did not present a true picture of facts as encountered in the course of a systematic campaign for the control of hookworm, for some of the reports did not employ the hemoglobin findings of the same people while others were based on selected cases. It was attempted to reduce these varying factors to a minimum in the selection of the differnet zones, communities and cases presented in this paper.

(1) Source of material.

A campaign for the control of hookworm disease was initiated during September 1914 by the Government of Costa Rica with the cooperation of the International Health Board of the Rockefeller Foundation. This work is still in operation. The writer was director of this campaign from January 1, 1915, to May 29, 1921.

During the course of this campaign, which reached the major portion of the rural population, about three hundred thousand persons (300,000) were examined, and more than fifty (50) percent were found infected with hookworm.

For the purpose of this analysis certain counties, comprising twenty-two communities, were selected which represent a fair sample of the population as to sex, age, occupation, incidence and severity of infection. Three of the counties lay within the tropical zones and in which malaria is endemic, while the remaining counties represent the nonmalaria zones.

Of these counties there were selected every case pronounced cured upon microscopic re-examination and having complete hemoglobin tests before treatment and after cure. This gives the hemoglobin indices of the same people of the same regions under two conditions, that of before treatment and after cure. No other factor is introduced. These cases are tabulated primarily in accordance with the zones in which they reside, malarial or nonmalarial. In all there are 2605 patients, which are a representative group as to sex, age, occupation and social status.

(2) Description of Costa Rica.

Costa Rica is one of the Central American Republics lying between Nicaragua on the north, Panama on the south, the Pacific Ocean on the west and the Caribbean Sea on the east.

This country has a varied climate due to the broken and mountainous formation of its topography. The costal areas are low lying, marshy and highly malarious, typical tropical zones of high temperature, humidity and rainfall. The mountain ranges, which are extensions of the Andean system, form a central tableland with an altitude of more than 3000 feet which is quite salubrious. From this tableland the mountains slope with varying rapidity to the tropical coastal zones. About fifty percent of the population live in the center tableland.

(3) Occupation grouping.

Costa Rica is an agricultural country and more than eighty percent of its people are engaged in some form of agricultural pursuits. Cultivation is still by the crude ancient methods.

Bananas and cacao are produced on the Atlantic seaboard, for export. These are cultivated on large estates. The laborers, of which the west Indian negro predominates, live in small villages, at some distance from the farms. Healthy town sites are the exception. The average wage is higher than in the more healthy central tableland.

Sugar, coffee, grains (corn and beans) and cattle are the chief products of the subtropical regions. Coffee is the principal export crop of the temperate zone, while grains, vegetables and dairy products are grown for local consumption. The numerous small landowners live on their farms but work part of each day on the large estates. During the coffee harvest, in which entire families are engaged, the migration of people from district to district is very heavy.

For the purpose of this study the occupations are classified into four groups, domestic, agriculture, trades and school. This is a simple grouping and fits the occupation distribution of the country. This occupation distribution permits a correlation with the possible sources of hookworm infection. The domestic and school groups are principally a measure of environment and not occupation.

(a) Domestic, includes children under five years of age, housewives and servants. Housework either as servants or housewives is the principal occupation of this group. During the harvest season, two to four months of the year, women and children over eight years of age, work one or more hours in the field. Hookworm infection in this group is probably contracted about the home.

(b) Agriculture represents the largest working group. This work calls for long hours of toil under tropical sun and rain. Economically the farm hand is in the best situation of the laboring class and according to the standards of adjoining countries the wages are good. The small farm owner is particularly favored as he produces the food for his family and working part of each day earns sufficiently to provide for some of the simple luxuries.

(c) Trades includes artisans, skilled laborers and clerks. Skilled laborers are generally found in the larger cities, and they are not included in our statistics. This accounts for the small number of artisans comprising our series. In the small villages the skilled laborers live under similar conditions as the agricultural group, except that a larger proportion of the former wear shoes.

(d) Schools represents the pupils attending school.

(4) Age grouping.

For a uniform method of reporting hookworm infection by ages an arbitrary division was made for various age groups to correspond in some measure with definite activities as well as to indicate probable sources of infection. The age groups are: 0-5 years, 6-18 years, 19-40 years, 41-60 years and 61 plus years. The group of five years and under (0-5) is usually concentrated about the home. Six to eighteen (6-18) is the school age, though this is not quite uniform for fifteen years of age is probably the average maximum. Full field duties are not assumed until this age or later. The group from nineteen to forty (19-40) years represents the period of active field work and forty-one to sixty (41-60) years partial field work while those above sixty (60) years life is about the home again. Infection sources can, with a measure of accuracy, be pointed to with a grouping of this kind.

(5) Hookworm infection rates.

The greatest part of the accessible rural population was examined in the course of the field operations from September 1914 to March 31, 1921. The results of this work gave a hookworm infection rate of 57.1 percent. Details are noted in Table No. 1.

Table No. 1

Rates for hookworm infection, treatment and cure.

	Number	Percent
Census	272331	
Persons examined	229113	84.1
Persons infected with hookworm	130813	57.1
Persons treated	121197	93.2
Persons cured	51560	42.5

(6) Sanitation.

Privies were rarely found in the rural districts. In the towns the most prevalent type of latrine was the surface or shallow pit. None were flyproof. These privies concentrate pollution, which can serve as a reservoir for the spread of infection about the homes unless proper precautions are taken.

During the period in review 48424 houses were inspected, of these 6046 or 12.4 percent had some form of privies on first inspection, while during the course of the campaign 16787 privies were built, an increase of 34.7 percent.

(7) Hemoglobin standards.

The Tallquist scale was employed for the hemoglobin examination. The method of examination was uniform, the finger or ear punctured, the first drop of blood wiped off after which the specimen was taken. The reading was made with the light coming from the back and falling on the scale over the left shoulder. The first test or that prior to treatment was usually made in the homes during the census taking, this as a rule

preceded the treatment by two or three weeks. The final , or after cure examination was invariably made in the laboratory office.

(3) Method of calculating hemoglobin index.

For the purpose of calculating the hemoglobin indices the value given to the scale grouping is as shown in table number 2. This method is of sufficient accuracy for hemoglobin taken by the tallquist scale.

Table No.2

Hemoglobin Scale	Value
30 to 39	35
40 to 49	45
50 to 59	55
60 to 69	65
70 to 79	75
80 to 89	85
90 plus	95

II

HEMOGLOBIN BEFORE TREATMENT

(1) Hemoglobin of Total Cases.

The hemoglobin index of the total cases was 64.5 percent. 369 persons, or 14 percent had hemoglobin less than 59 percent and 1547 persons or 59.4 percent had less than 69 percent of hemoglobin. The hemoglobin scale group of 70 to 79 included the largest number of cases, 885 o r 33.9 percent of the total. Table number 3 gives the distribution according to the scale and the cumulative percent.

Table number 3.

Hemoglobin by number and percent of Cases Before treatment			
Hemoglobin Scale	Number Cases	Percent	Cumulative Percent
30 to 39	63	2.4	2.4
40 to 49	303	11.6	14.0
50 to 59	569	21.9	35.9
60 to 69	612	23.5	59.4
70 to 79	885	33.9	93.3
80 to 89	153	5.9	99.2
90 plus	20	.8	100.0

(2) Hemoglobin according to Sex

The 1366 males gave a hemoglobin index of 64.7 percent and the 1239 females an index of 63.7 percent. Of the males, 58.2 percent and of the females, 60.4 percent had a hemoglobin of 69 percent or less.

Table number 4

Hemoglobin Scale by Sex, Number, Percentage;

Scale	No. of Cases		Percent		Cumulative	
	Male	Female	Male	Female	Male	Female
30 to 39	29	34	2.1	2.7	2.1	2.7
40 to 49	163	140	11.8	11.3	13.9	14.0
50 to 59	299	270	21.9	21.8	35.8	35.8
60 to 69	306	306	22.4	24.6	58.2	60.4
70 to 79	456	429	33.4	34.7	91.6	95.1
80 to 89	97	56	7.1	4.5	98.7	99.6
90 plus	16	4	1.3	0.4	100.	100.

Tables number 4 and 51, 52 give~~s~~ this distribution in detail.

The highest index for the males was 66.8 percent in the age group 19 to 40 years while in the females the highest index occured in the age group 6 to 18 years, which was 64.7 percent. The least hemoglobin, 55.9 percent, occured in the age group of 5 years and under, while in the females the lowest index was 58.8 percent in the ager groups 0 to 5 and 61 plus.

Table number 5

Hemoglobin Index by Age and Sex

Age Groups	Number of Cases		Index	
	Male	Female	Male	Female
0 to 5	65	78	55.9	58.8
6 to 18	624	646	63.9	64.7
19 to 40	477	369	66.8	64.3
41 to 60	166	133	64.6	64.5
61 plus	34	13	65.3	58.8

(3) Hemoglobin according to Age

The age group of five years and under showed the lowest hemoglobin index, 57.5 percent, followed by the age group of 61 plus with 63.5 percent; 6 to 18 years with 64.3 percent, while the groups 19 to 40 and 41 to 60 had the highest indices 65.7 percent for the former and 65.2 for the latter.

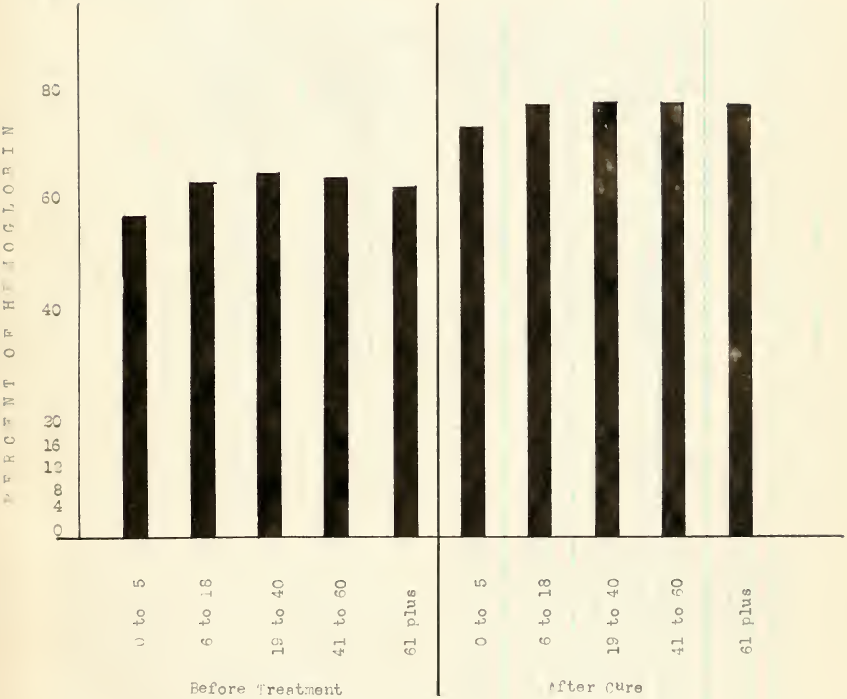
Table number 6

Hemoglobin Index by: Age

Group	Index
0 to 5	57.5
6 to 18	64.3
19 to 40	65.7
41 to 60	65.2
61 plus	63.5

Chart No. I

Hemoglobin Indices
According to Age Groups
Before Treatment and After Cure



The distribution of cases in accordance with the hemoglobin scale shows that the age group of 0 to 5 years had the largest number of cases in the hemoglobin scale of 50 to 59, while all of the other groups had the greatest number of cases in the 70 to 79 percent scale. This is given in the following table.

Table number 7

Hemoglobin and percentages by Age Groups

Hemoglobin Scale	Total	Age Groups				
		0-5	6-18	19-40	41-60	61
TOTAL	2605	143	1270	846	299	47
30 to 39	63	8	29	20	4	2
40 to 49	303	33	139	94	31	6
50 50 59	569	36	291	169	62	11
60 to 69	612	32	304	186	81	9
70 to 79	885	32	444	295	98	16
80 to 89	153	2	58	67	23	3
90 plus	20	--	5	15	--	--
30 to 39	2.4	5.6	2.3	2.4	1.3	4.3
40 to 49	11.6	23.	16.1	11.1	10.4	12.9
50 to 59	21.9	25.1	23.8	20.	20.8	23.4
60 to 69	23.5	22.4	23.9	22.	27.1	19.1
70 to 79	33.9	23.4	35.	34.8	32.8	34.
80 to 89	5.9	1.5	4.5	7.9	7.6	6.3
90 plus	.8	--	.4	1.8	--	--

(4) Hemoglobin according to Occupation

The agriculturist or tiller of the soil gave the best hemoglobin index, 66.3 percent, next comes the trades or skilled laborer with 65.3 percent followed by domestic with 63.7 percent and school with 63.4 percent. Of the domestics, the index of the males is 58.2 percent and of the females 63.5 percent. Of the schoolchildren, the males hade the lower index, 62.7 percent while the females had 64.1 percent.

Table number 8

Indices by Occupation

Occupation	Total	Male	Female
	P.C.	P.C.	P.C.
TOTAL	64.5	65.8	63.7
Domestic	63.7	58.2	63.5
Agricult.	66.5	66.5	---
Trades	65.3	65.3	
School	63.4	62.7	64.1

Tables number 39 and 40 demonstrates that of the domestics both male and female, the lowest hemoglobin was in the age group of five years and under. The highest index in the females was in the ages 6 to

18 years and in the males in the ages 19 to 40 years. In the occupations, agriculture and trades only males are recorded, and in these the the ages 19 to 40 gave the highest index, 66.3 percent and 68.1 percent respectively.

(5) Hemoglobin of Persons residing in Malarious Zones.

Malaria is endemic in more or less of a severe form in all of the tropical regions and less so in the subtropical regions. The higher tablelands are free from this disease. We are therefore in a position to compare the hemoglobin of groups coming from the two zones. The customs, habits and people of these two zones are in all respects comparable, for the purpose of this analysis.

The hemoglobin index of the 519 hookworm cases (cured) living in the malarious zones was 50.7 percent. Of the total cases, the age group 41 to 60 years gave the highest index, it being 51.4 percent and the lowest occured in the age group 61 plus; this was 47.5 percent. The best index amongst the males was 52.2 percent in the age group 41 to 60 and the lowest, 48.3 percent in the ages of 5 years and under. The females gave a distinct distribution, the highest index 51.6 occured during the ages 6 to 18 and the lowest, 45 percent, in the age group 61 or more years.

Table number 9

Hemoglobin Indices by Age and Sex

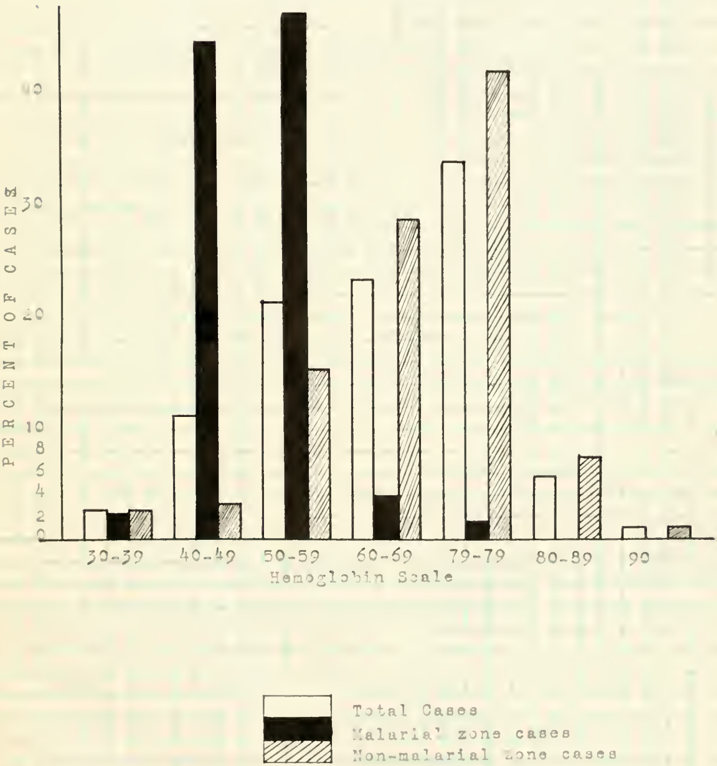
Malarious zones: Before Treatment:

Age Groups	Total	Male	Female
	P.C.	P.C.	P.C.
TOTAL	50.7	50.7	50.7
0 to 5	49.9	48.3	49.1
6 to 18	50.9	50.3	51.6
19 to 40	50.8	51.4	50.2
41 to 60	51.4	52.2	50.3
61 plus	47.5	49.5	45.0

In accordance with the occupations in the malarial zones, the most favorable index was in the trades or artesan group, with 53.3

Chart No. 2

Percent of Cases according to
the Hemoglobin Scale
By Zone residence. Before Treatment
(total of each group equals 100 percent.)



followed by the agriculturist with 51.2 percent, school with 51.1 percent and the lowest in the domestic having 4[illegible].8 percent.

(6) Hemoglobin of Persons residing in Non-malarious Zones.

The general hemoglobin standard of the hookworm cases in the non-malarious zones is 67.9 percent. Of the total cases the highest hemoglobin, 69.4 percent occured in the ages 19 to 40 years and the lowest, 60.8 percent in the age group 0 to 5 years. The hemoglobin standard of the men was 68.3 percent and of the women 66.9 percent. Of the males the best rating was in the ages 19 to 40 years, with 70.6 percent and the lowest in the ages 5 years and under with 58.8 percent.

Table number 10

Hemoglobin standards by AGE & SEX
Before Treatment. Non-malarious Zs

Age Groups	Total	Male	Female
	P.C.	P.C.	P.C.
Total	67.9	68.3	66.9
0 to 5	60.8	58.8	62.5
6 to 18	67.4	67.1	67.6
19 to 40	69.4	70.6	67.7
41 to 60	68.9	70.0	67.9
61 plus	69.0	69.4	67.5

In accordance with occupation distribution, those engaged in agriculture gave an index of 70 percent; the trades 72.1 percent; school 66.6 percent and domestic 66.1 percent, Of the total cases, by age in relation to occupation, the domestics had the maximum hemoglobin, 68 percent, in the age group 41 to 60 years, and the lowest in the age group 0 to 5 years with 60.6 percent. The males gave a greater variation of the indices in the same age groups with a maximum of 71.6 and a minimum of 58.8 percent; while in the females the maximum occured in the ages of 6 to 18 with a slight variation in the ages above this. The agriculture

Table number 11

Indices by Occupation and Sex
Non-malarious Zones.

Occupation	Total	Male	Female
	P.C.	P.C.	P.C.
Domestic	66.1	61.0	66.8
Agricult.	70.0	70.	
Trades	72.1	72.1	
School	66.6	66.0	67.3

and trade groups indicate that the highest index, 70.5 percent in the former and 75.9 percent in the latter occurs in the agesg 19 to 40 years. Distribution according to occupation, age, sex is given in tables number 41 to 46.

III

HEMOGLOBIN AFTER CURE

(1) Hemoglobin Indices of the Total Cases.

The hemoglobin standard after cure was 78.8 percent. This is an increase of 14.4 in the hemoglobin scale. The greatest number of persons 1096 or 42,2 percent had a hemoglobin of 80 to 89 percent, while 1509 or 50.8 percent had less than 79 percent of hemoglobin. The trend to a higher hemoglobin was quite uniform. This shifting to an increased scale in the hemoglobin is noted in that before treatment 93.3 percent had a hemoglobin of 79 or less while after cure only 50.8 percent fell into this hemoglobin group.

Table number 12

Hemoglobin Scale by Number and percent of Cases. After Cure

Hemoglobin Scale	Number	Percent	Cumulat Percent
30 to 39			
40 to 49	1	*	
50 to 59	28	1.1	1.1
60 to 69	415	15.9	17.
70 to 79	882	33.8	50.8
80 to 89	1096	42.2	93.
90 plus	183	7.	100.

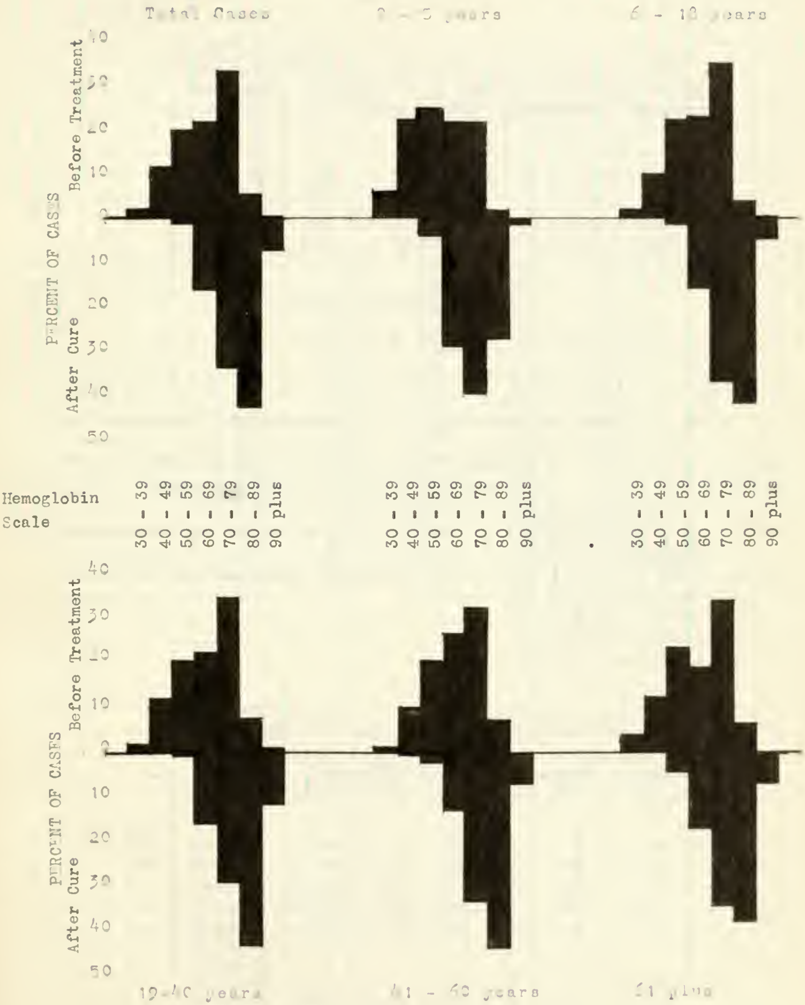
(* less than 0.1 percent)

(2) Hemoglobin Indices according to Sex.

The males showed an index of 78.8 percent and the females 78.7 percent. There is practically no difference in the hemoglobin indices of the sexes when taken as sex only; but when considered as to occupation and age distribution the range of hemoglobin indices is quite marked. The maximum hemoglobin 80.2 percent, was found in the male age group 19 to 40 years. The lowest 73.4 percent occured in the female age group of 61 or more years.

Chart No. 3

Percent of Cases according to the Hemoglobin Scale by Age Groups Before Treatment and After Cure. (Total of each group equals 100 percent)



The details of sex distribution are given in tables number 32, 34 and chart number 8 .

Table number 13

Hemoglobin Scale by Sex, Number and Percent						
Hemoglobin	Number		Percent		Cumulative	
Scale	Male	Female	Male	Female	Male	Female
30 to 39						
40 to 49	1		.1		.1	
50 to 59	13	15	1.0	1.2	1.1	1.2
60 to 69	225	190	16.4	15.3	17.5	16.5
70 to 79	454	428	33.2	34.5	50.7	51.0
80 to 89	564	532	41.4	42.9	92.1	93.9
90 plus	109	74	7.9	6.1	100.	100.

(3) Hemoglobin according to Age.

In accordance with the age groupings, the lowest hemoglobin average, 74.6 percent, was in the ages of less than 5 years, followed by the ages of 61 or more years with 77.5 percent of hemoglobin, while the other age groups had a fairly uniform indices of 78.8 and 78.6 percent. Table number 14 gives the distribution and percentage of the number of cases by age and hemoglobin scale.

Table No. 14

Index by Age	
AGE	Index
0 to 5	74.6
6 to 18	78.6
19 to 40	78.8
41 to 60	78.8
61 plus	77.5

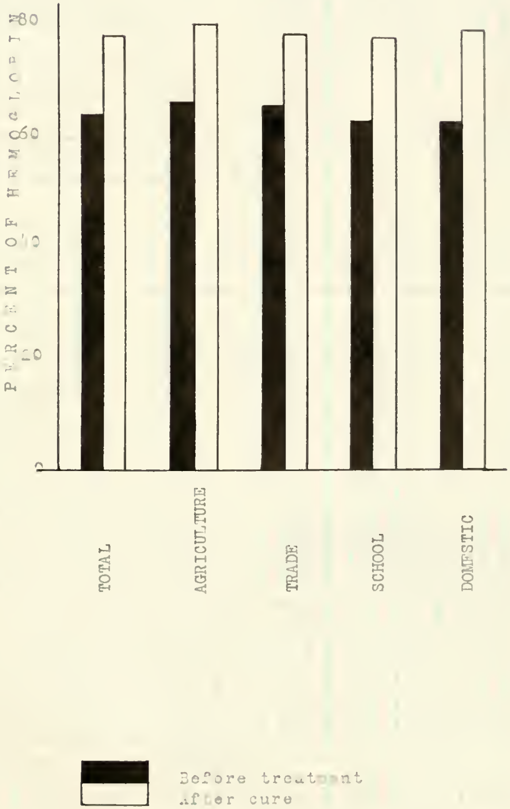
Table Number 15

Hemoglobin and Percentage by Age Groups-After Cure						
Hemoglobin	Age Groups					
Scale	Total	0-5	6-18	19-40	41-60	61plus
TOTAL	2605	143	1270	846	299	47
30 to 39						
40 to 49	1				1	
50 to 59	28	4	9	6	7	2
60 to 69	415	41	193	134	39	8
70 to 79	882	56	465	244	101	16
80 to 89	1096	40	540	368	130	18
90 plus	183	2	63	94	21	3
30 to 39						
40 tp 49	*				. .3	
50 to 59	1.0	2.8	.7	.7	2.3	4.3
60 to 69	15.9	28.7	15.2	15.8	13.	17.1
70 to 79	33.9	39.2	36.6	28.8	33.8	34.3
80 to 89	42.1	28.	42.5	43.5	43.5	38.2
90 plus	7.1	1.3	5.0	11.2	7.1	6.1

* less than 0.1 percent

Chart No. 4

HEMOGLOBIN INDICES
According to Occupation
Before treatment and after cure



(4) Hemoglobin according to Occupation.

The maximum hemoglobin index after cure was in the agriculture group with 80 percent, this was followed by 78.8 percent in the artisan, 77.7 percent in the schools and 78.8 percent in the domestic. Of the domestic group the index of the females was 78.8 percent and of the males 76.2 percent, while in school children the females had an index of 78.3 percent and males 77.2 percent.

Table number 16

Hemoglobin Indices by Occupation & Sex. Total Cases. After Cure

Occupation	Total	Male	Female
	P.C.	P.C.	P.C.
Total	78.7	78.8	78.7
Domestic	78.6	76.2	78.8
Agricult.	80.	80.	
Trades	78.6	78.6	
School	77.7	77.2	78.3

The highest index of the agriculturist and trades was 80.2 percent occuring in the ages 6 to 40 in the former and 6 to 18 in the latter.

(5) Hemoglobin of Residents of Malarious Zones.

The hemoglobin index of the residents of malarious zones increased from 50.7 percent to 68.8 percent. The age group 19 to 40 years gave the maximum rate, 69.3 percent, while before treatment the maximum index was in the ages 41 to 60 years. The sexes show practically no difference in the final indices. Of the occupational groups the trades gave the highest reading, 72.8 percent, but the number of cases is rather small to accept this as final.

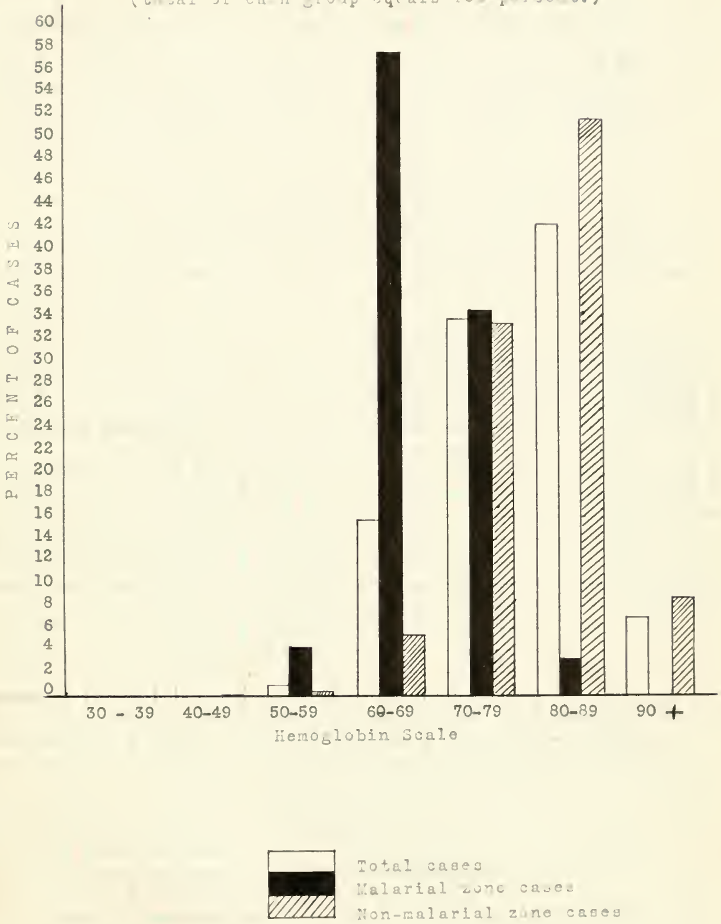
Table number 17

Hemoglobin Standards by Age & Sex: After Cure. Malarious Zones

Age Groups	Total	Male	Femal
	P.C.	P.C.	P.C.
TOTAL	68.8	68.6	68.8
0 to 5	67.	66.6	67.2
6 to 18	69.	68.6	69.4
19 to 40	69.3	69.	68.9
41 to 60	68.3	68.3	68.4
61 plus	65.8	68.5	63.

The scholars gave a hemoglobin value for the total cases, of 69.3 percent, for the boys it was 68.6 percent and for the girls, 70.1 percent. The

Chart No. 5 — Percent of Cases according to the Hemoglobin Scale By Zone residence. After Cure. (total of each group equals 100 percent.)



increase is nevertheless slightly greater for the males. The farmers show a hemoglobin increase from 51.2 percent to 68.5 percent. The domestic hemoglobin rate was 67.9 percentfor the total cases, while for the males it was 66 percent and for the females 68.7 percent. The details are given in table number 41 to 43.

(6) Hemoglobin of Residents of Non-malarious Zones.

The after cure hemoglobin value of the residents of non-malarious zones was 81.3 percent. The men gave an index of 81.5 percent and the women 81.1 percent. The age group 19 to 40 years gave the highest rating, for the total cases 82.6 percent, for the males 83.1 percent and for the females 81.1 percent. The index of the male domestics was 79.2 percent and of the female 81.2 percent and the age group 19 to 40 years gave an index of 81.6 percent in the former and 85 percent in the latter. The index of the trades was 83.6 percent and the agriculturist 82.7 percent. In both of these occupations the ages 19 to 40 years also gave the maximum indices, 83 percent for the farmer and 84.2 percent for the trade. Details are given on tables number 44 to 46.

Table Number 18

Hemoglobin Indices by Age & Sex
After Cure. Non-Malarious Zones.

Age Groups	Total	Male	Female
TOTAL	81.3	81.5	81.1
0 to 5	77.6	77.7	77.5
6 to 18	80.7	80.4	81.
19 to 40	82.6	83.1	81.8
41 to 60	81.6	82.2	80.8
61 plus	81.5	82.	80.

IV

DISCUSSION

(1) Hemoglobin Indices before Treatment.

None of the contributing factors in the production of anemia, such as severe field work, subnourishment due to the lack of the necessary quantity of food and the general insufficiency of the diet, endemic diseases and faulty living are considered in this analysis. These hazards are opera-

tive, more or less, throughout the normal life of these people and affect the final or after cure hemoglobin in the same force as they influenced the primary anemia. The recuperative power, after treatment which causes the expulsion of the hookworm and other intestinal parasites, is accelerated because the digestive tract is better able to assimilate food.

The data presented gives the hemoglobin findings, as demonstrated under field conditions, before treatment and after cure. The only variable has been that of taking two or more treatments for hookworm.

(2) Hemoglobin according to Zones.

The outstanding difference in the hemoglobin indices before treatment is demonstrated by comparing the indices according to residence in malarious or non-malarious zones.

The hemoglobin index for all cases was 64.5 percent, for those living in malarious zones, 50.7 percent and those not residing in such regions 67.9 percent. This indicates a hemoglobin reduction of 17.2 percent due to the hazard of residing in malarial districts when compared with the index of the non-malarials and a reduction of 13.8 percent from the index of the total cases.

Table Number 19

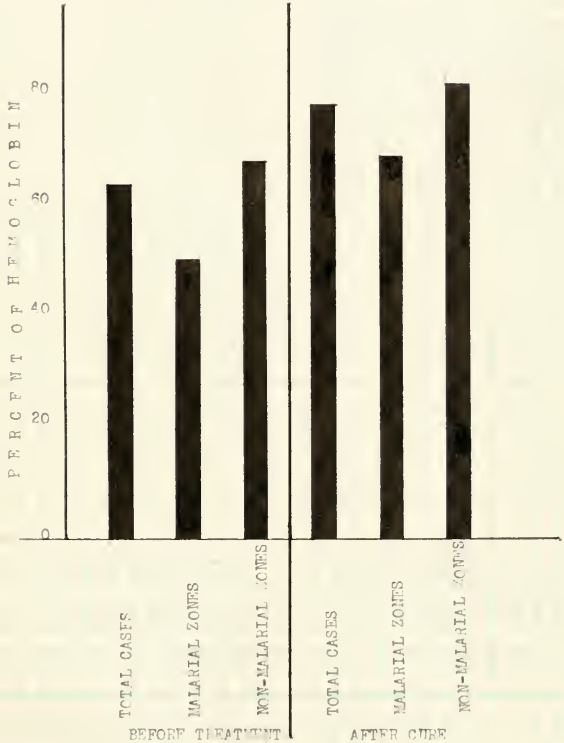
Increase of Hemoglobin Indices by Sex and Zone

SEX & ZONES	Before Treatmt	After Cure	Increase
MALE			
TOTAL	64.7	78.8	14.1
Malarious	50.7	68.6	17.9
Non-malar.	68.3	81.5	13.2
FEMALE			
TOTAL	63.7	78.7	15.0
Malarious	50.7	68.8	18.1
Non-malar.	66.9	81.1	14.2

The food factor as a cause of anemia is unquestionably operative to a greater ex- in the malarious zones. Disability and the resultant loss of time from work is a more frequent occurrence amongst the malarials, this is reflected by a reduced food intake.

Chart No. 6.

HEMOGLOBIN INDICES
According to Residence in
Malarious or Non-Malarious Regions
Before Treatment and After Cure



(3) Hemoglobin according to Occupation.

The character of occupation gives the next marked difference in the hemoglobin indices. The agriculturist of field worker had an index of 66.5 percent, this is 2 percent above the general average of 64.5.

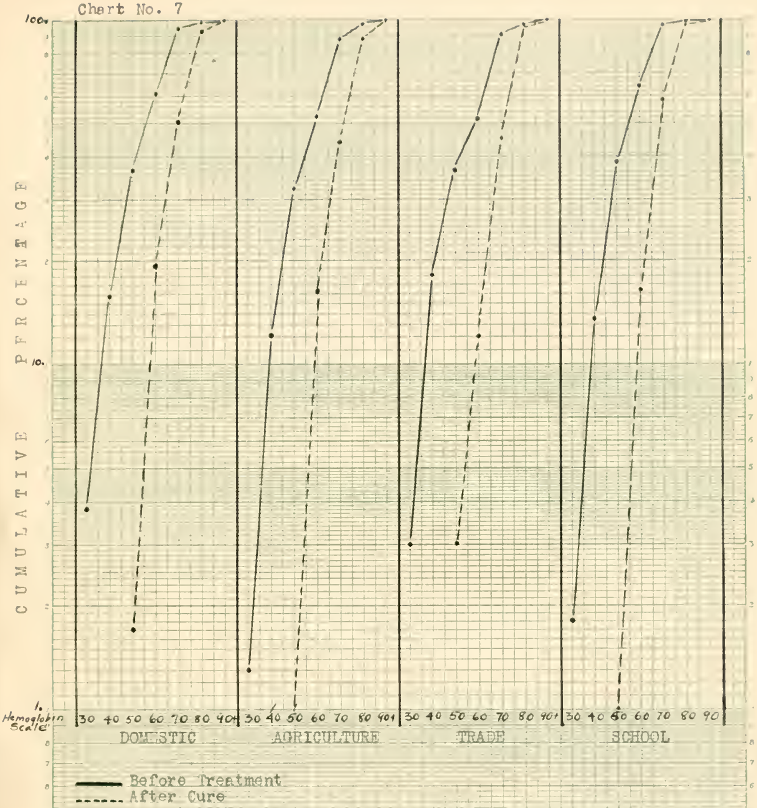
In the malarial zones the farmer had a hemoglobin that was 0.5 percent above the average while in the nonmalarial zone it was 2.1 percent above the average. This record is contrary to the experience in other countries. To appreciate the probable cause of this variation the customs that prevail in Costa Rica must be understood. The homes are usually in the immediate vicinty of the farms. The yard and the bushes and trees about the house serve for the deposit of excreta. The field worker labors from sun-up to sun-down. His fields serves his needs for a toilet. The chances that he uses the same field or encounters the same spot to become repeatedly infected is remote or at best is not as frequent as those who use the yard about the house. He is less exposed to massive infection. While those about the homes are daily using their favorite bush or nook in the immediate vicinty of the house. The greatest hazard is thus to those who spend the greatest part of their time about the homes where soil infestation is the greatest and massive infeetions more likely to occur. The records of the domestic and that of the school groups, and these spend the major part of their time about the homes, tend to confirm this conclusion, for the minimum hemoglobin indices were found in these groups.

Table Number 20

Hemoglobin Indices by Occupation & Zones. Before Treatment

Occupation	Total	Malarial	Non-m
	P.C.	P.C.	P.C.
Total	64.5	50.7	67.9
Domestic	63.4	43.8	66.1
Agricult.	66.5	51.2	70.
Trades	65.3	53.3	72.1
School	63.4	51.1	66.6

Chart No. 7



CUMULATIVE PERCENTAGE
of Hemoglobin according to Occupation
Before Treatment and After Cure
TOTAL CASES

(4) Hemoglobin according to Sex.

The difference according to sex was slight, the males 64.7 percent exceeded the females 63.7 percent by 1 percent in the total cases and by 1.4 percent in the residents of non-malarial zones. The hemoglobin index of the sexes living in the malarial regions was the same.

Table Number 21

Hemoglobin Indices by Occupation, Sex and Zone. Before Treat.

OCCUPATION	TOTAL		MALARIAL		NON MALARIAL	
	Male	Female	Male	Female	Male	Female
	PERCENT	Percent	Percent	Percent	Percent	Percent
TOTAL	64.7	63.7	50.7	50.7	68.3	66.9
Domestic	58.2	63.5	48.5	49.9	61.	66.8
Agriculture	66.5		51.2		70.	
Trade	65.3		53.3		72.1	
School	62.7	64.1	50.	52.2	66.	67.3

By occupation and sex there is a significant difference. The male domestic gave an index of 58.2 percent and the female domestic 63.5 percent. In the non-malarious zones the index for the men was 61. percent and that f6o the women it was 66.8 percent while in the malarial zones it was 48.5 percent for the men and 49,9 percent for the women. This is an average of 5.3 percent of the hemoglobin greater for the women domestic than that for the men. The greater anemia found in the males who engage in domestic work may be the reason why they do not or rather cannot undertake the usual occupation of man, that of field work as a farm hand. Their excessive anemia prevents hard physical labor.

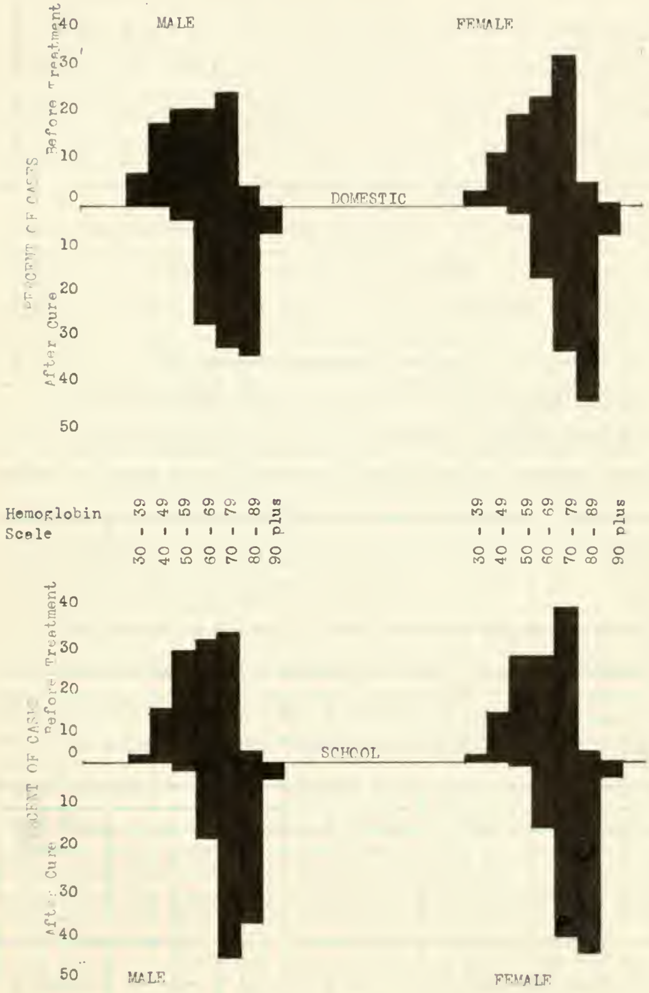
Table Number 22

Excess of Hemoglobin in the female to the Male. by Occupation.

ZONE	Domestic	School
	Percent	Percent
TOTAL	5.3	1.4
Non-Malarial	5.8	2.2
Malarial	1.4	1.3

The index of the agriculturist was 66.5 percent, this gave a spread of 8.3 percent of hemoglobin between the male domestic and the farmer. In the non-malarial zones this spread was 9 percent and in the malarial zones it was 2.7 percent.

Chart No. 8 Percent of Cases according to the Hemoglobin Scale by Occupation and Sex. Before Treatment and After Cure. (total of each group equals 100 percent)



The skilled laborer or trades, had the highest hemoglobin index in both the malarious and non-malarious zones. The number of cases comprising this group is rather small on which to base final conclusions, but it does tend to indicate that this occupation is least exposed to hookworm infection, or to other hazards that produce anemia. As a group they spend the greater part of their time about the homes, therefore they should have a high infection rate and a low hemoglobin index, if our conclusions are correct that massive infection is common amongst those who spend the greater part of their time in the homes. As a rule the skilled laborer wears shoes and this reduces their infection and severity rate.

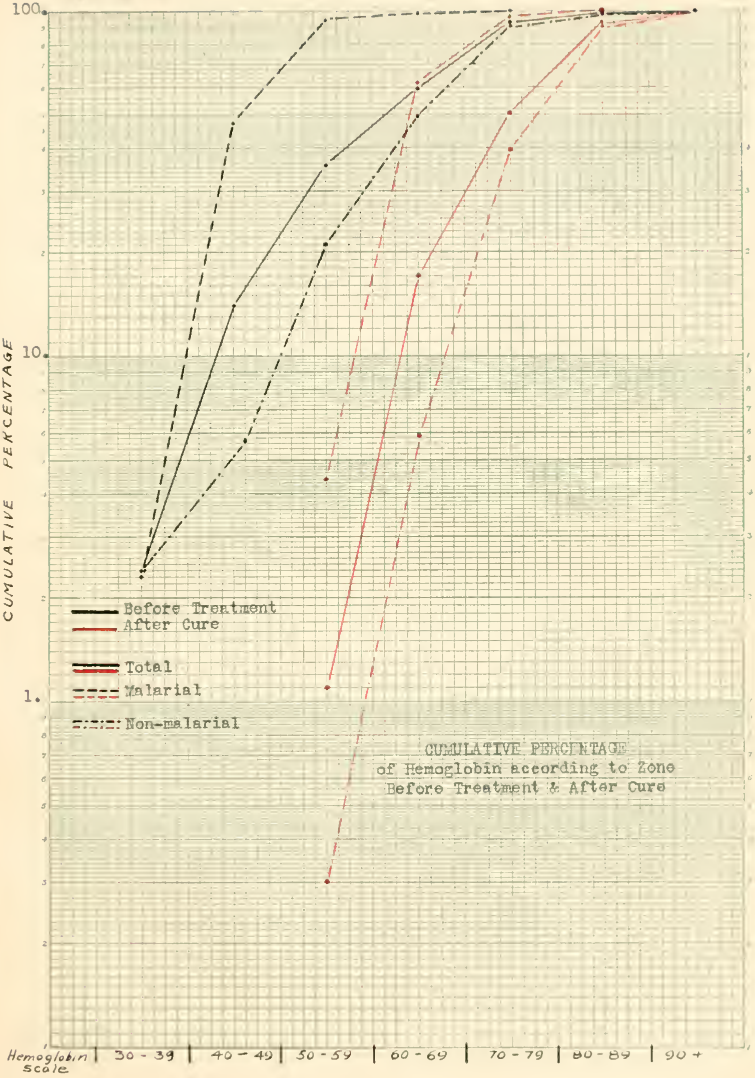
(5) Hemoglobin according to Age.

The lowest hemoglobin index occured in the ages under 5 years; this was 7 hemoglobin units below the total average. This is probably due primarily to a lower normal hemoglobin standard, greater exposure to massive infections and a lesser resistence to hookworm disease. There is a marked difference in the indices of the males and females of this age. The females exceed the male index by 2.9 percent.

The highest hemoglobin standard occured in the ages 19 to 60 years. This is the period of active labor in the field, it also includes the period of the fullest physiological activity of the body.

The anemia rate of the ages 61 or more years based on a small number of cases (47) was 65.3 percent for the males and 58.8 percent for the females. This is a striking difference. That this is due to a particular activity of the disease in the females is hardly likely. The women of Costa Rica bear a heavy burden in labor and work and a further burden of many pregnancies. Their system is exhausted at an earlier age. The women of the ages 6 to 13 years have a slightly higher hemoglobin in-

Chart No. 9



CUMULATIVE PERCENTAGE of Hemoglobin according to Zone Before Treatment & After Cure

dex that the males.

According to age and occuptation there were striking variations. The most favorable hemoglobin index of the domestics was in the age group 6 to 18 years, with 65.4 percent (average of total 63.4 percent), while of the farmer and skilled laborer the age group 19 to 40 had the highest index, 66.8 percent for the former (average of the total 66.5 percent) and 68.1 percent in the latter (average of the total 65.3 percent). This picture is rather suggestive; the domestic group composed almost entirely of women (89 men 857 women) present the most favorable hemoglobin index during that period of life when the least demands are made of it, the ages 6 to 18 years; while of the agricultural and trade groups the most favorable index occured during the period of greatest activity of life, 19 to 40 years of age.

V
HEMOGLOBIN INDICES AFTER CURE

(1) Hemoglobin indices of the Total Cases.

The after cure index of the 2605 treated cases was 78.7 percent. This is an absolute hemoglobin increase of 14.2. The individual variations of hemoglobin was most marked both before treatment and after cure. The final hemoglobin ranged around 80 percent, indicating that this point may be the normal standard of hemoglobin for uninfected persons. This is greater than the hemoglobin index of 73.1 percent which I found for 8838 persons examined during 1918 and reported free from hookworm.

(2) Hemoglobin indices according to Sex.

The average after cure hemoglobin for the males was 78.8 percent and for the females 78.7 percent. Prior to treatment the males had an index of one percent greater than the females, this difference does not persist after

cure. In both sexes the highest index occurred in the age group 19 to 40 years. The lowest index of the males occurred in the age group of 5 years and under and in the females in the group of 61 or more years. The difference between the maximum index and the minimum index in the males is 5.6 of hemoglobin and in the females 5.9 of hemoglobin.

Table Number 23

Range of Hemoglobin Indices by Sex & Age. After Cure

SEX		Maximum in Age Grup	Maximum Hgb. Index	Minimum in Age Grp	Minimum Hgb. Index	Diff. in Hgb.
Before	Male	19-40	66.8	0-5	55.9	10.9
Treatment	Female	6-13	64.7	0-5 61 +	58.8	5.9
After	Male	19-40	80.2	0-5	74.6	5.6
Cure	Female	19-40	79.3	61 +	73.4	5.9

The above table shows that in the males the difference between the maximum and minimum hemoglobin indices was reduced, after cure, to about one half of what it was prior to treatment, from 10.9 percent to 5,6 percent, while for the females the difference remained unchanged.

(3) Hemoglobin indices according to Occupation.

Of the total cases the farmer gave the highest after cure index, that of 80 percent. Trade and domestic followed with 78.6 percent and the scholars with the least, 77.7 percent of hemoglobin. The males show the greates hemoglobin spread, 3.8 percent, between the domestic and the agriculture groups. The hemoglobin difference of these occupations was reduced from 8.3 percent before treatment to 3.8 percent at after cure. The male domestic apparently has a greater regenerative power, for his gain is greatest though the final hemoglobin falls short of the total average.

The women show very little difference in the hemoglobin indices according to occupation groups.

Chart No. 10

Percent of Cases According to
the Hemoglobin Scale and Occupation
Before Treatment and After Cure
(total of each group equals 100 percent)

DOMESTIC

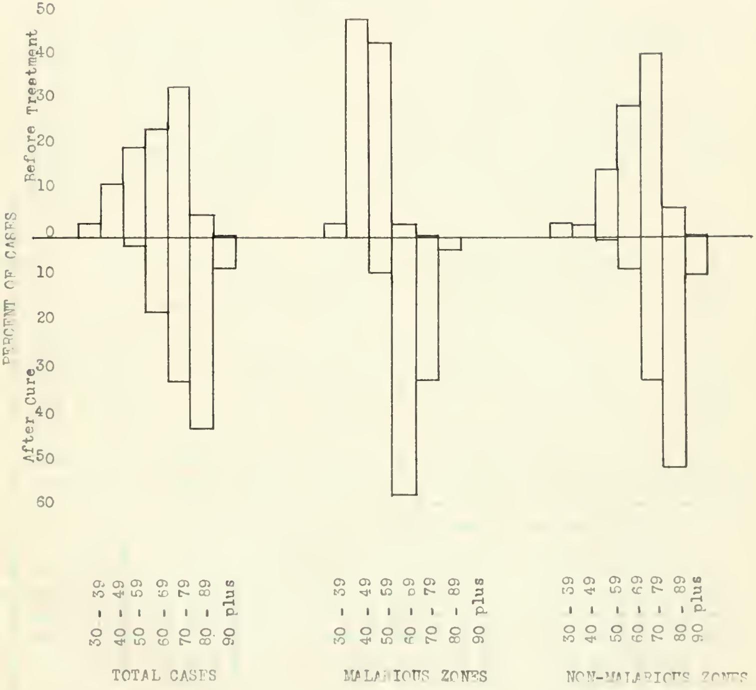


Chart No. 11

Percent of Cases According to
the Hemoglobin Scale and Occupation
Before Treatment and After Cure
(total of each group equals 100 percent)

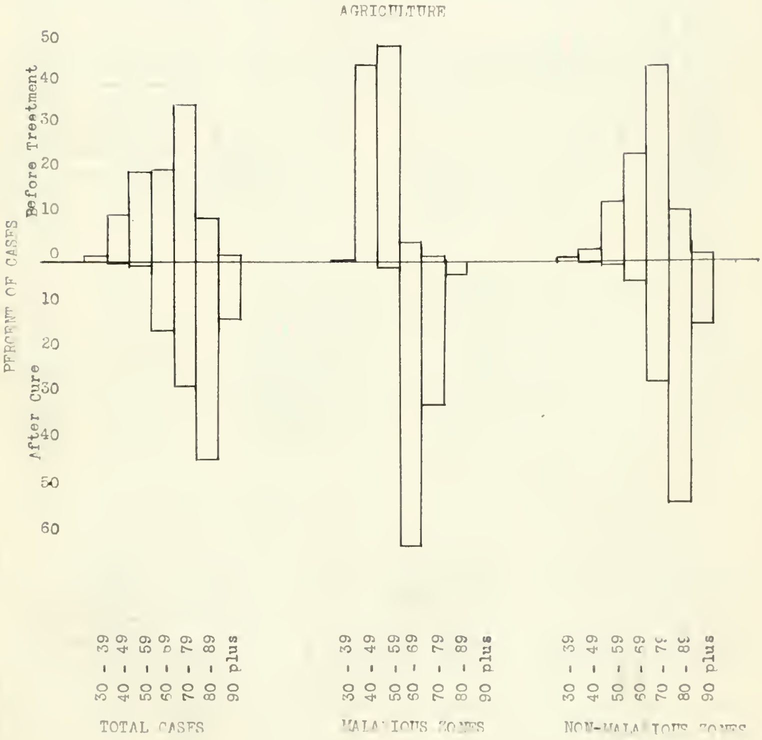


Chart No. 12

Percent of Cases According to
the Hemoglobin Scale and Occupation
Before Treatment and After Care
(total of each group equals 100 percent)

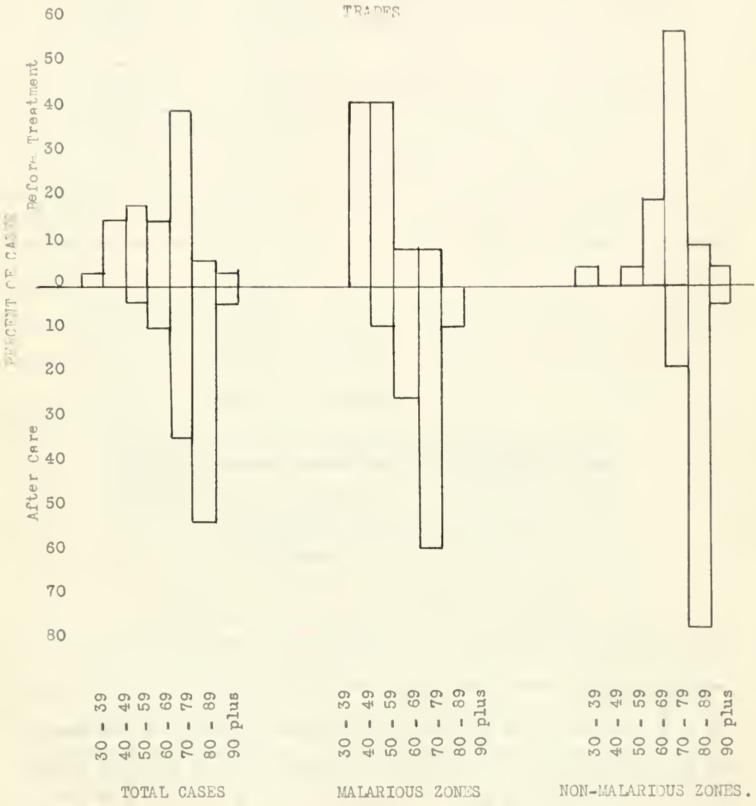


Table Number 24

Hemoglobin Indices by Occupation, Sex and Zone. After Cure:						
Occupation	TOTAL		MALARIOUS		NON-MALARIOUS	
	Male	Female	Male	Female	Male	Female
	P.C.	P.C.	P.C.	P.C.	P.C.	P.C.
TOTAL	78.3	78.7	68.6	[illegible].8	81.5	81.1
Domestic	76.2	78.8	[illegible]	68.2	[illegible].3	81.[illegible]
Agriculture	80.		68.5		82.7	
Trades	78.6		73.8		83.6	
School	7[illegible].2	78.3	68.5	70.1	79.4	80.5
Hgb. Spread	3.8	0.5	6.5	1.9	4.4	0.7

The hemoglobin index of the women domestics, prior to treatment, was 5.3 percent greater than that of the men domestics, but after cure this difference was reduced to 2.6 percent. Of the school children the greater primary index of the girls was reduced from 1.4 percent prior to treatment to 0.8 after cure. Here again it is demonstrated that those with a lower primary hemoglobin show a proportionately greater increase after cure. The following table shows this clearly.

Table number 25

Range in Hemoglobin Indices by Sex and Occupation				
Occupation:		Male	Female	DIFFER
Domestic	Before Treatment	58.2	63.5	5.3
	After Cure	76.2	78.8	2.6
School	Before Treatment	63.7	64.1	1.4
	After Cure	77.5	78.3	0.8

(4) Hemoglobin of Residents of Malarious Zones.

The residents of malarial zones experienced a hemoglobin increase from 50.7 prior to treatment to 68.7 percent after cure. This is an improvement of 18 hemoglobin units. The highest index, 69.3 percent, was seen in the group 19 to 40 years of age and the least, 65.6 percent in the ages of 5 years or less. Of the males the ages 19 to 40 had the maximum index, 69 percent, and the least, 56.6 percent in the ages under 5 years;

while of the females the ages 6 to 18 years had the best hemoglobin index, 69.4 percent and the least in the age group of 61 or more years.

Table Number 26

Hemoglobin Indices by Occupation, Sex & Zones. After Cure

Age Groups	TOTAL		MALARIOUS		NON-MALARIOUS	
	Male	Female	Male	Female	Male	Femal
	P.C.	P.C.	P.C.	P.C.	P.C.	P.C.
TOTAL	78.8	78.7	68.6	68.9	81.5	81.1
0 to 5	74.6	74.6	66.6	67.2	77.7	77.5
6 to 18	78.1	78.9	68.6	69.4	80.4	81.
19 to 40	80.2	79.3	69.	68.9	83.1	81.8
41 to 60	79.2	78.4	68.3	68.4	82.3	80.8
61 plus	79.1	73.4	68.5	63.	83.	80.
Hgb. Spread	5.6	5.9	2.4	6.4	5.4	4.3

The range of the hemoglobin according to occupation is of a similar character. The trades had an index of 72.8 percent followed by scholars with 69.3 , agriculture 68.5 and domestic 67.9 percent. The domestics had an after cure index that was 2.2 percent greater for the women than that for the men, while the difference between the sexes prior to treatment was only 1.4 percent. This is the only exception encountered where difference in the hemoglobin is not reduced affer cure. This is shown in table number 27 .

Table number 27

Hemoglobin Excess of the Female to the Male. By Occupation and Zones

Zone	Domestic		School	
	Before Treat.	After Cure	Before Treat.	After Cure
Non-Malarial	5.8	2.	1.3	1.1
Malarial	1.4	2.2	2.2	1.5

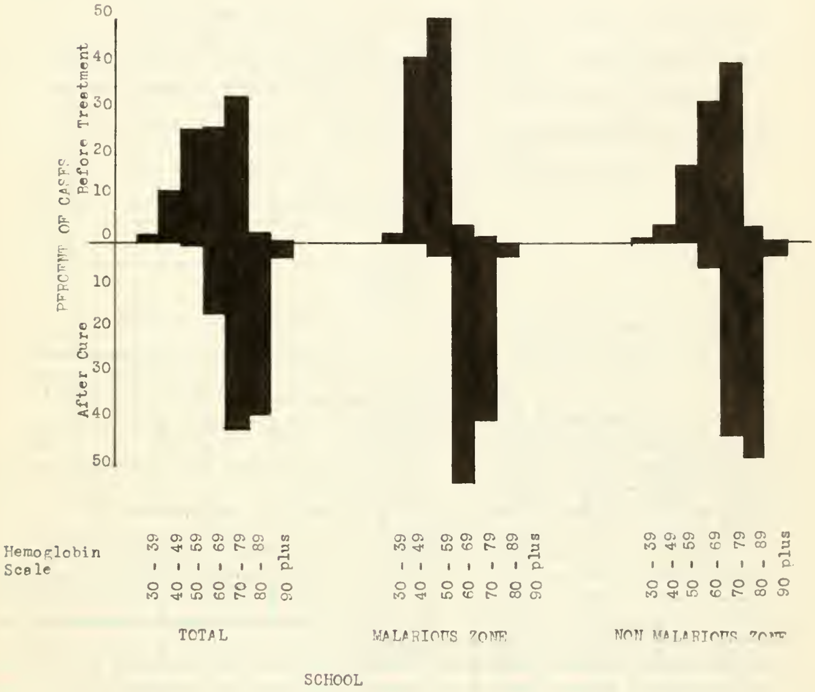
The normal hemoglobin of residents of malarious zones uninfected with hookworm, is around 70 percent if the after cure findings can be accepted as correct.

(5) Hemoglobin of Residents of Non-Malarious Zones.

The patients residing in non-malarial zones gave an after cure index of 81.3 percent an increase from 67.9 percent. The most striking improvement was noted in the age group of 5 years and under being 1[illegible].8 percent,

Chart No. 13

Percent of Cases according to
the Hemoglobin Scale, Occupation and
Zone.
Before Treatment and After Cure.
(total of each group equals 100 percent)



According to occupation the domestic group had an increase of 15 hemoglobin units. These are the groups that had the lowest hemoglobin indices before treatment and therefore experienced the greatest increase to bring their hemoglobin to an average standard for the uninfected, which is from 80 to 82 percent.

The difference in the after cure hemoglobin between the residents of malarious zones and non-malarious zones persists - though not as great - as that encountered before treatment. This difference was reduced from 17.2 to 13.4 of hemoglobin. A greater gain of 4.6 hemoglobin units by those with a lower initial index, and the final hemoglobin indices of these two zones show a lesser difference by this amount.

VI
SUMMARY

Viewing the increase of hemoglobin on a percentage basis to that of the hemoglobin before treatment it is noted that the total cases had an improvement of 22 percent, the males 21.7 percent and the females 23.5 percent. Table number 28 demonstrates that the age group 5 years and under, of the total cases, males and females had the greatest percentage of hemoglobin increase likewise this group had the lowest hemoglobin to start with.

Table Number 28

Hemoglobin Index by Age and Sex. Total Percentage Increase after Cure

SEX and AGE	Before Treat.	After Cure	Increase Amount	Increase P. C.
TOTAL	64.5	78.7	14.2	22.0
" MALE	64.7	78.8	14.1	21.7
" FEMALE	63.7	78.7	15.	23.5
TOTAL				
0 to 5	57.5	74.6	17.1	29.7
6 to 18	64.3	78.6	14.3	22.2
19 to 40	65.7	78.8	13.1	19.9
41 to 60	65.2	78.8	13.6	20.8
61 plus	63.5	77.5	14.	22.
MALE: 0 - 5	55.9	74.6	18.7	33.4
6 to 18	63.9	78.1	14.2	22.2
19 to 40	66.8	80.2	13.4	20.
41 to 60	65.8	79.2	14.6	22.6
61 plud	65.3	79.1	13.8	21.1
FEMALE: 0-5	58.8	74.6	15.8	26.8
6 to 18	64.7	78.9	14.2	21.9
19 to 40	64.3	79.3	15.0	23.3
41 to 60	64.5	78.4	13.9	21.5
61 plus	68.8	73.4	14.6	24.8

The minimum increase occured in the age group 19 to 40 years of the males and 6 to 18 years of the females. These age groups had the best hemoglobin indices before treatment.

The inhabitants of the malarious zones had a flat hemoglobin increase of 18, which is an improvement of 35.5 percent. The greatest improvement occured in the ages 61 or more years. This age group also had the lowest hemoglobin to start with. The minimum increase occured in the age group 41 to 60 of the males and 6 to 18 of the females. These groups had the highest index before treatment.

Table Number 29

Hemoglobin Index by Age and Sex, giving increase after cure. MALARIOUS ZONES

SEX and AGE	Before Treat.	After Cure	Increase Amount	Increase P.C.
TOTAL	50.7	68.7	18.	35.5
" MALE	50.7	68.6	17.9	35.2
" FEMALE	50.7	68.8	18.1	35.7
TOTAL				
0 to 5	49.	67.	18.	36.7
6 to 18	50.9	69.	18.1	35.
19 to 40	50.8	69.3	18.5	36.4
41 to 60	51.4	68.3	16.9	32.8
61 plus	47.5	65.8	18.3	38.5
MALE				
0 to 5	48.3	66.6	18.3	37.8
6 to 18	50.3	68.6	18.3	36.3
19 to 40	51.4	69.	17.6	34.2
41 to 60	52.2	68.3	16.1	30.8
61 plus	49.5	68.5	19.0	38.3
FEMALE				
0 to 5	49.1	67.2	18.1	36.8
6 to 18	51.6	69.4	17.8	34.4
19 to 40	50.2	68.9	18.7	37.2
41 to 60	50.3	68.4	18.1	35.9
61 plus	45.	63.	18.0	40.0

The residents of the non-malarial regions experienced a hemoglobin increase of 13.4, or 19.7 percent. This is 4.6 hemoglobin units less than the increase that occured in the patients living in malarious zones, Of the non-malarial cases the greatest increase was shown by the females which was 14.2 hemoglobin units or 21.2 percent. According to age the greatest improvement was had by the ages 5 years and under; 16.8 hemoglobin units or 27.6 percent. The females and the age group of 0 to 5 had the lowest indices before treatment. The least improvement is noted in the age groups as follows:

of the total cases 61 years or more with 18.1 percent and of the male and female in the ages 41 to 60 years with increases of 17.4 percent for the former and 17.8 percent for the latter. These age groups also had the lowest hemoglobin indices to start with.

Table Number 30

Hemoglobin index by Age & Sex; showing increase After Cure. NON-MALARIOUS ZONE

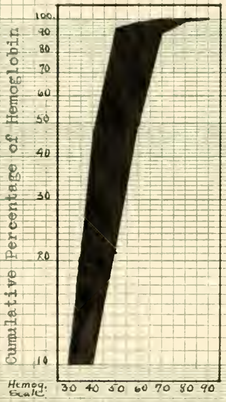
SEX and AGE	Before Treat.	After Cure	Increase	
			Amount	P.C.
TOTAL	67.9	81.3	13.4	19.7
" MALE	68.3	81.5	13.2	19.3
" FEMALE	66.9	81.1	14.2	21.2
TOTAL				
0 to 5	60.3	77.6	16.8	27.6
6 to 18	67.4	80.7	13.3	19.7
19 to 40	69.4	82.6	13.2	19.
41 to 60	68.9	81.6	12.7	18.4
61 plus	69.	81.5	12.5	18.1
MALE				
0 to 5	58.8	77.7	19.9	32.1
6 to 18	67.1	80.4	13.3	19.8
19 to 40	70.6	83.1	12.5	17.7
41 to 60	70.	82.2	12.2	17.4
61 plus	69.4	82.	12.6	18.2
FEMALE				
0 to 5	62.5	77.5	15.0	24.
6 to 18	67.6	81.	13.4	19.8
19 to 40	67.7	81.8	14.1	20.8
41 to 60	67.9	80.	12.1	17.8
61 plus	67.5	80.	12.5	18.5

The occupation groups also demonstrate that the greatest hemoglobin and percentage increases occured in those having had the lowest hemoglobin index prior to treatment. The domestics and scholars with the lowest inicial indices experienced hemoglobin increases of 23.4 percent and 22.6 percent. Of the residents of the non-malarial zones these occupations also gave the most favorable increase while of the residents of the malarial zones the greatest improvement occured amongst the trade or skilled laborers. The least improvement was noted in the agriculture group.

There appeared to be a uniform tendency for the hemoglobin to register a distinct rise, after cure, reach a certain definite level and

Chart No. 14

HEMOGLOBIN LOSS DUE TO MALARIA



stay there. These levels are probably the normal standard for the respective groups. These levels are materially lower than those accepted for temperate or non hookworm infested regions. This lower standard is due to other anemia producing factors operating where hookworm and malaria are endemic.

Table Number 31

Hemoglobin Index by OCCUPATION and ZONE
Showing percentage increase After Cure

Occupation & Zone	Before Treat	After Cure	Increase Amount	Increase P.C.
TOTAL	64.5	78.7	14.2	22.0
Domestic	63.4	78.6	15.2	24.
Agricul.	66.5	80.	13.5	20.3
Trades	65.3	78.6	13.3	20.4
School	63.4	77.7	14.3	22.6
Malarial				
Total	50.7	68.7	18.	35.3
Domestic	49.8	67.9	18.1	36.3
Agricul.	51.2	68.5	17.3	33.8
Trades	53.3	72.8	19.5	36.6
School	51.1	69.3	18.2	35.6
NonMalar.				
Total	67.9	81.3	13.4	19.7
Domestic	66.1	81.1	15.0	22.7
Agricul.	70.0	82.7	12.7	18.1
Trades	72.1	83.6	11.5	15.9
School	66.6	79.9	13.3	19.9

VII
CONCLUSIONS.

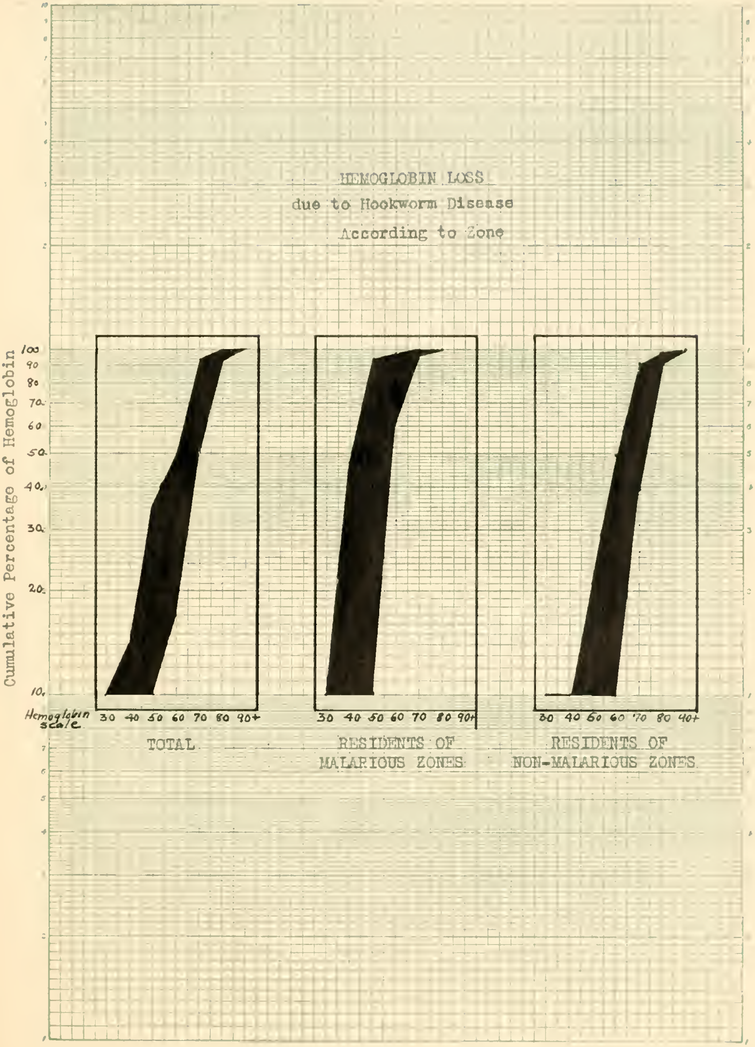
1. The hemoglobin standards of the hookworm cases considered in this study was demonstrated to be as follows:

Total Cases........................64.5 percent
Residents of Malarious Zones........50.7 percent
Residents of Non-malarious Zones....67.9 percent

2. Accepting a hemoglobin index of 67.9 percent as that representing the average grade of anemia produced by an uncomplicated case of hookworm disease; the anemia loss due to malaria is 17.2 hemoglobin units. (67.9 minus 50.7)

3. The field worker or agriculture showed the least anemia and those working about the homes, domestics, the greatest anemia. This

Chart No. 15



HEMOGLOBIN LOSS
due to Hookworm Disease
According to Zone

indicates that soil pollution is greater about the homes, which is a fact, and that the hazard of repeated and massive infection is greatest to those who are exposed to this pollution by their duties keeping them about the homes. This condition is also demonstrated to be operative in the age groups who are confined about the houses; 0 to 5 years and 61 plus years.

4. There was no significant difference in the hemoglobin indices of the sexes according to total cases. The sexes did show a distinct variation when considered according to their occupations. The hemoglobin index of the women exceeded the men by 5.3 percent for the domestic and 1.4 percent for the schoolchildren,

5. Two or more hookworm treatments increased the hemoglobin indices to:

Total Cases..............................78.7 percent
Residents of Malarious Zones............68.8 percent
Residents of Non-malarious Zohes.........81.3 percent

6. The anemia production of hookworm disease is therefore:

Total Cases......................14.2.hemoglobin units.
Residents of Malarious Zones.....18.1 hemoglobin units.
Residents of Non-malarious Zones.13.4 hemoglobin units.

7. The hemoglobin loss was greatest in the residents of malarious zones which is indicative that their general resistence was less or reduced and that other anemia producing factors, as that of faulty nutrition, were operative.

8. The greatest hemoglobin gains occured in those groups having the minimum hemoglobin prior to treatment for hookworm disease.

9. A definite recuperative power in the hemoglobin has been shown to have occured following treatment. This increase seems to be limited

to a certain maximum point in the hemoglobin, which may be the normal hemoglobin standard (with individual variations) for the population as a whole and for the two health zones. This normal hemoglobin standard is approximately for the;

Total Cases............................80 percent
Residents of Malarious Zones...........70 percent
Residents of Non-malarious Zones......82 percent

10. These conclusions are applicable to the conditions in Costa Rica as disclosed by the analysis of the 2305 cases comprising this series.

I wish to acknoweldge the helpful assistance of Mattie M Schapiro in the preparation and tabulation of the data from the crude records.

SUMMARY TABLES.

Hookworm Cases

Hemoglobin before Treatment and after Cure
By Sex and Age Groups

Table No. 32

			TOTAL CASES						
					AGE GROUPS				
		Hgb Scale	Percent	Total	0-5	6-18	19-40	41-60	61 plus
MALE	Before Treatment	Total	100.	1366	65	624	477	166	34
		Index	-	64.7	55.9	63.9	66.8	65.8	65.3
		30-39	2.1	29	3	16	7	3	-
		40-49	11.8	163	17	72	54	16	4
		50-59	21.9	299	17	144	90	39	9
		60-69	22.4	306	12	152	103	33	6
		70-79	33.4	456	14	212	162	56	12
		80-89	7.1	97	2	25	48	19	3
		90	1.3	16	-	3	13	-	-
	After Cure	Total	100.	1366	65	624	477	166	34
		Index	-	78.8	74.6	78.1	80.2	79.2	79.1
		30-39	-	-	-	-	-	-	-
		40-49	0.1	1	-	-	-	1	-
		50-59	1.0	13	2	6	3	2	-
		60-69	16.4	225	20	99	76	25	5
		70-79	33.2	454	23	239	130	49	13
		80-89	41.4	564	18	251	206	76	13
		90	7.9	109	2	29	62	13	3
FEMALE	Before Treatment	Total	100.	1239	78	646	369	133	13
		Index	-	63.7	58.8	64.7	64.3	64.5	58.8
		30-39	2.7	34	5	13	13	1	2
		40-49	11.3	140	16	67	40	15	2
		50-59	21.8	270	19	147	79	23	2
		60-69	24.6	306	20	152	83	48	3
		70-79	34.7	429	18	232	133	42	4
		80-89	4.5	56	-	33	19	4	-
		90	0.4	4	-	2	2	-	-
	After Cure	Total	100.	1239	78	646	369	133	13
		Index	-	78.7	74.6	78.9	79.3	78.4	73.4
		30-39	-	-	-	-	-	-	-
		40-49	-	-	-	-	-	-	-
		50-59	1.2	15	2	3	3	5	2
		60-69	15.3	190	21	94	58	14	3
		70-79	34.5	428	33	226	114	52	3
		80-89	42.9	532	22	289	162	54	5
		90	6.1	74	-	34	32	8	-

Hookworm Cases
Malarial Zones

Hemoglobin before Treatment and after Cure
By Sex and Age

Table No. 33

	Hgb Scale	Percent	Total	MALE				
				AGE GROUPS				
				0-5	6-18	19-40	41-60	61 Plus
Before Treatment	Total	100	280	18	119	100	36	7
	Index	-	50.7	48.3	50.3	51.4	52.2	49.5
	30-39	1.7	5	-	3	2	-	-
	40-49	45.6	128	12	55	46	11	4
	50-59	46.7	131	6	56	42	24	3
	60-69	4.2	12	-	5	6	1	-
	70-79	1.8	4	-	-	4	-	-
	80-89	-	-	-	-	-	-	-
	90	-	-	-	-	-	-	-
After Cure	Total	100	280	18	119	100	36	7
	Index	-	68.6	66.6	68.6	69	68.3	68.5
	30-39	-	-	-	-	-	-	-
	40-49	-	-	-	-	-	-	-
	50-59	3.9	11	2	4	3	2	-
	60-69	58.9	165	11	69	59	21	5
	70-79	34.6	97	5	45	33	12	2
	80-89	2.6	7	-	1	5	1	-
	90	-	-	-	-	-	-	-
				FEMALE				
Before Treatment	Total	100	239	22	115	71	26	5
	Index	-	50.7	49.1	51.6	50.2	50.3	45.
	30-39	2.9	7	-	1	3	1	2
	40-49	43.9	105	13	48	30	13	1
	50-59	47.6	114	8	59	36	9	2
	60-69	3.7	9	1	3	2	3	-
	70-79	1.9	4	-	4	-	-	-
	80-89	-	-	-	-	-	-	-
	90	-	-	-	-	-	-	-
After Cure	Total	100	239	22	115	71	26	5
	Index	-	68.8	67.2	69.4	68.9	68.4	63
	30-39	-	-	-	-	-	-	-
	40-49	-	-	-	-	-	-	-
	50-59	5.0	12	2	3	1	4	2
	60-69	55.6	133	13	63	45	10	2
	70-79	35.1	84	7	44	21	11	1
	80-89	4.3	10	-	5	4	1	-
	90	-	-	-	-	-	-	-

Hookworm Cases
Non-Malarial Zones
Hemoglobin before Treatment and after Cure
By Sex and Age Groups

Table No. 34

		Hgb Scale	Percent	Total	AGE GROUPS 0-5	6-18	19-40	41-60	61 Plus
MALE	Before Treatment	Total	100.	1086	47	505	377	130	27
		Index	-	68.3	58.8	67.1	70.6	70.	69.4
		30-39	2.2	24	3	13	5	3	-
		40-49	3.2	35	5	17	8	5	-
		50-59	15.4	168	11	88	48	15	6
		60-69	27.	294	12	147	97	32	6
		70-79	41.6	452	14	212	158	56	12
		80-89	8.9	97	2	25	48	19	3
		90	1.7	16	-	3	13	-	-
	After Cure	Total	100.	1086	47	505	377	130	27
		Index	-	81.5	77.7	80.4	83.1	82.2	82
		30-39	-	-	-	-	-	-	-
		40-49	.1	1	-	-	-	1	-
		50-59	.2	2	-	2	-	-	-
		60-69	5.5	60	9	30	17	4	-
		70-79	32.9	357	18	194	97	37	11
		80-89	51.3	557	18	250	201	75	13
		90	10.	109	2	29	62	13	3
FEMALE	Before Treatment	Total	100.	1000	56	531	298	107	8
		Index	-	66.9	62.5	67.6	67.7	67.9	67.5
		30-39	2.7	27	5	12	10	-	-
		40-49	3.5	35	3	19	10	2	1
		50-59	15.6	156	11	88	43	14	-
		60-69	29.7	297	19	149	81	45	3
		70-79	42.5	425	18	228	133	42	4
		80-89	5.6	56	-	33	19	4	-
		90	.4	4	-	2	2	-	-
	After Cure	Total	100.	1000	56	531	298	107	8
		Index	-	81.1	77.5	81.	81.8	80.	80.
		30-39	-	-	-	-	-	-	-
		40-49	-	-	-	-	-	-	-
		50-59	.3	3	-	-	2	1	-
		60-69	5.7	57	8	31	13	4	1
		70-79	34.4	344	26	182	93	41	2
		80-89	52.2	522	22	284	158	53	5
		90	7.4	74	-	34	32	8	-

Hookworm Cases
Hemoglobin before Treatment and after Cure
Total Cases - By Age Groups

Table No. 35

	Hgb			AGE GROUPS				
	Scale	Percent	Total	0-5	6-18	19-40	41-60	61 Plus
Before Treatment	Total	100.	2605	143	1270	846	299	47
	Index	-	64.5	57.5	64.3	65.7	65.2	63.5
	30-39	2.4	63	8	29	20	4	2
	40-49	11.6	303	33	139	94	31	6
	50-59	21.9	569	36	291	169	62	11
	60-69	23.5	612	32	304	186	81	9
	70-79	33.9	885	32	444	295	98	16
	80-89	5.9	153	2	58	67	23	3
	90	.8	20	-	5	15	-	-
After Cure	Total		2605	143	1270	846	299	47
	Index		78.7	74.6	78.6	78.8	78.8	77.5
	30-39	-	-	-	-	-	-	-
	40-49	-	1	-	-	-	1	-
	50-59	1.0	28	4	9	6	7	2
	60-69	15.9	415	41	193	134	39	8
	70-79	33.9	882	56	465	244	101	16
	80-89	42.1	1096	40	540	368	130	18
	90	7.1	183	2	63	94	21	3

Hookworm Cases
Malarial Zones

Hemoglobin before Treatment and After Cure
By Age - Total Cases

Table No. 36

	Hgb Scale	Percent	Total	AGE GROUPS				
				0-5	6-18	19-40	41-60	61 plus
Before Treatment	Total	100.	519	40	234	171	62	12
	Index	-	50.7	49.	50.9	50.8	51.4	47.5
	30-39	2.3	12	-	4	5	1	2
	40-49	44.8	233	25	103	76	24	5
	50-59	47.2	245	14	115	78	33	5
	60-69	4.0	21	1	8	8	4	-
	70-79	1.7	8	-	4	4	-	-
	80-89	-	-	-	-	-	-	-
	90	-	-	-	-	-	-	-
After Cure	Total	100	519	40	234	171	62	12
	Index	-	68.7	67	69	69.3	68.3	65.8
	30-39	-	-	-	-	-	-	-
	40-49	-	-	-	-	-	-	-
	50-59	4.4	23	4	7	4	6	2
	60-69	57.4	298	24	132	104	31	7
	70-79	34.8	181	12	89	54	23	3
	80-89	3.4	17	-	6	9	2	-
	90	-	-	-	-	-	-	-

Hookworm Cases

Non-Malarial Zones
Hemoglobin before Treatment and after Cure
Total Cases - By Age Groups

Table No. 37

	Hgb Scale	Percent	Total	AGE GROUPS				
				0-5	6-18	19-40	41-60	61
Before Treatment	Total	100.	2086	103	1036	675	237	35
	Index	-	67.9	60.8	67.4	69.4	68.9	69
	30-39	2.4	51	8	25	15	3	-
	40-49	3.3	70	8	36	18	7	1
	50-59	15.5	324	22	176	91	29	6
	60-69	28.3	591	31	296	178	77	9
	70-79	42.2	877	32	440	291	98	16
	80-89	7.3	153	2	58	67	23	3
	90	1.0	20	-	5	15	-	-
Aftre Cure	Total	100.	2086	103	1036	675	239	35
	Index	-	81.3	77.6	80.7	82.6	81.6	81.5
	30-39	-	-	-	-	-	-	-
	40-49	-	1	-	-	-	1	-
	50-59	.3	5	-	2	2	1	-
	60-69	5.6	117	17	61	30	8	1
	70-79	33.6	701	44	376	190	78	13
	80-89	51.7	1079	40	534	359	128	18
	90	8.8	183	2	63	94	21	3

Hookworm Cases

Hemoglobin before Treatment and After Cure

By Occupation, Sex and Age.

Table No. 38

Occupation	AGE GROUPS	HEMOGLOBIN									SCALE								
		TOTAL CASES									TOTAL CASES								
		Before Treatment									After Cure								
		In-dex	To-tal	30-39	40-49	50-59	60-69	70-79	80-89	90	In-dex	To-tal	30-39	40-49	50-59	60-69	70-79	80-89	90
Total	Total	64.5	2605	63	303	569	612	885	153	20	78.7	2605	-	1	28	415	882	1096	183
	Percent	-	100.	2.4	11.6	21.9	23.5	33.9	5.9	0.8	-	100.	-	-	1.1	15.9	33.8	42.2	7.0
	0-5	57.5	143	8	33	36	32	32	2	-	74.6	143	-	-	4	41	56	40	2
	6-18	64.3	1270	29	139	291	304	444	58	5	78.6	1270	-	-	9	193	465	540	63
	19-40	65.7	846	20	94	169	186	295	67	15	78.7	846	-	-	6	134	244	368	94
	41-60	65.2	299	4	31	62	81	98	23	-	78.8	299	-	1	7	39	101	130	21
	61	63.5	47	2	6	11	9	16	3	-	77.5	47	-	-	2	8	16	18	3
Domestic	Total	63.4	946	36	114	196	232	317	48	3	78.6	946	-	-	17	157	305	401	66
	Percent	-	100.	3.8	12.1	20.7	24.5	33.6	5.0	.3	-	100.	-	-	1.7	16.6	32.3	42.5	6.9
	0-5	57.5	141	8	32	36	32	31	2	-	74.6	141	-	-	4	40	56	39	2
	6-18	65.4	276	11	24	55	62	100	23	1	79.8	276	-	-	2	41	78	132	23
	19-40	64.3	380	14	41	80	86	138	19	2	79.4	380	-	-	4	59	115	169	33
	41-60	64.7	136	1	15	23	49	44	4	-	78.5	136	-	-	5	14	53	56	8
	61	58.8	13	2	2	2	3	4	-	-	73.4	13	-	-	2	3	3	5	-
Agriculture	Total	66.5	818	11	88	164	167	294	79	15	80	818	-	1	5	128	227	365	92
	Percent	-	100.	1.3	10.8	20.	20.2	35.9	9..7	2.	-	100.	-	.1	0.6	15.6	27.7	44.6	12.5
	0-5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6-18	66.7	183	3	20	32	32	82	11	3	80.2	183	-	-	2	26	46	93	16
	19-40	66.8	447	6	50	86	98	149	46	12	80.2	447	-	-	2	73	123	189	60
	41-60	66.1	154	2	14	37	31	51	19	-	79.3	159	-	1	1	24	45	70	13
	61	65.3	34	-	4	9	6	12	3	-	79.1	34	-	-	-	5	13	13	3
Trades	Total	65.3	33	1	5	6	5	13	2	1	78.6	33	-	-	1	3	11	17	1
	Percent	-	100.	3.	15.2	18.3	15.2	39.3	6.	3.	-	100.	-	-	3.	9.	33.2	51.8	3.
	0-5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6-18	67.	.5	-	-	1	2	2	-	-	81.	5	-	-	-	-	2	3	-
	19-40	68.1	19	-	3	3	2	8	2	1	80.2	19	-	-	-	2	6	10	1
	41-60	58.1	9	1	2	2	1	3	-	-	76.1	9	-	-	1	1	3	4	-
	61	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
School	Total	63.4	808	15	96	203	208	261	24	1	77.7	808	-	-	6	126	339	313	24
	Percent	-	100.	1.8	11.8	25.2	25.9	32.3	2.9	.1	-	100.	-	-	.7	15.6	41.9	38.8	3.
	0-5	60.	2	-	1	-	-	1	-	-	75	2	-	-	-	1	-	1	-
	6-18	63.4	806	15	95	203	208	260	24	1	77.7	806	-	-	6	125	339	312	24

Hookworm

Hemoglobin before Treatment and After Cure

By Occupation, Sex and Age.

Table No. 39

Occupation	AGE GROUPS	HEMOGLOBIN									SCALE								
		MALES									MALES								
		Before Treatment									After Cure								
		Index	Total	30-39	40-49	50-59	60-69	70-79	80-89	90	Index	Total	30-39	40-49	50-59	60-69	70-79	80-89	90
Total	Total	64.7	1366	29	163	299	306	456	97	16	78.8	1366	-	1	13	225	454	564	109
	Percent	-	100.	2.1	11.8	21.9	22.4	33.4	7.1	1.3	-	100.	-	.1	1.0	16.4	33.2	41.4	7.9
	0-5	55.9	65	3	17	17	12	14	2	-	74.6	65	-	-	2	20	23	18	2
	6-18	63.9	624	16	72	144	152	212	25	3	78.1	624	-	-	6	99	239	251	29
	19-40	66.8	477	7	54	90	103	162	48	13	80.2	477	-	-	3	76	130	206	62
	41-60	65.8	166	3	16	39	33	56	19	-	79.2	166	-	1	2	25	49	76	13
	61	65.3	34	-	4	9	6	12	3	-	79.1	34	-	-	-	5	13	13	3
Domestic	Total	58.2	89	7	17	19	19	23	4	-	76.2	89	-	-	3	23	28	30	5
	Percent	-	100.	7.8	19.	21.3	21.3	25.8	4.8	-	-	100.	-	-	3.3	25.8	31.5	33.6	5.8
	0-5	56.1	64	3	16	17	12	14	2	-	74.8	64	-	-	2	19	23	18	2
	6-18	61.3	11	3	-	1	3	2	2	-	78.6	11	-	-	-	3	3	3	2
	19-40	64.	11	1	1	1	3	5	-	-	80.4	11	-	-	1	1	1	7	1
	41-60	71.6	3	-	-	-	1	2	-	-	81.6	3	-	-	-	-	1	2	-
	61	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Agriculture	Total	66.5	818	11	88	164	167	294	79	15	80.	818	-	1	5	128	227	365	92
	Percent	-	100	1.3	10.8	20.	20.3	35.9	9.7	1.9	-	100.	-	.1	.6	15.6	27.7	44.6	12.5
	0-5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6-18	66.7	183	3	20	32	32	82	11	3	80.2	183	-	-	2	26	46	93	16
	19-40	66.8	447	6	50	86	98	149	46	12	80.2	447	-	-	2	73	123	189	60
	41-60	66.1	154	2	14	37	31	51	19	-	79.3	154	-	1	1	24	45	70	13
	61	65.3	34	-	4	9	6	12	3	-	79.1	34	-	-	-	5	13	13	3
Trades	Total	65.3	33	1	5	6	5	13	2	1	78.6	33	-	-	1	3	11	17	1
	Percent	-	100.	3.	15.2	18.3	15.2	39.3	6.	3.	-	100.	-	-	3.	9.	33.2	51.8	3.
	0-5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6-18	67.	5	-	-	1	2	2	-	-	81,	5	-	-	-	-	2	3	-
	19-40	68.1	19	-	3	3	2	8	2	1	80.2	19	-	-	-	2	6	10	1
	41-60	58.3	9	1	2	2	1	3	-	-	76.1	9	-	-	1	1	3	4	-
	61	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
School	Total	62.7	426	10	53	110	115	126	12	-	77.2	426	-	-	5	70	188	152	11
	Percent	-	100.	2.3	12.4	25.8	27.	29.5	3.	-	-	100.	-	-	1.1	16.4	44.1	35.6	2.8
	0-5	45.	1	-	1	-	-	-	-	-	65.	1	-	-	-	1	-	-	-
	6-18	62.7	425	10	52	110	115	126	12	-	77.2	425	-	-	5	69	188	152	11

Hookworm

Hemoglobin before Treatment and after Cure
By Occupation, Sex and Age.

Table No. 40

Occupation	AGE GROUPS	HEMOGLOBIN									SCALE								
		FEMALE									FEMALE								
		Before Treatment									After Cure								
		Index	Total	30-39	40-49	50-59	60-69	70-79	80-89	90	Index	Total	30-39	40-49	50-59	60-69	70-79	80-89	90
Total	Total	63.7	1239	34	140	270	306	429	56	4	78.7	1239	-	-	15	190	428	532	74
	Percent	-	100.	2.7	11.3	21.8	24.6	34.7	4.5	.4	-	100.	-	-	1.2	15.3	34.5	42.9	6.1
	0-5	58.8	78	5	16	19	20	18	-	-	74.6	78	-	-	2	21	33	22	-
	6-18	64.7	646	13	67	147	152	232	33	2	78.9	646	-	-	3	94	226	289	34
	19-40	64.3	369	13	40	79	83	133	19	2	79.3	369	-	-	3	58	114	162	32
	41-60	64.5	133	1	15	23	48	42	4	-	78.4	133	-	-	5	14	52	54	8
	61	58.8	13	2	2	2	3	4	-	-	73.4	13	-	-	2	3	3	5	-
Domestic	Total	63.5	857	29	97	177	213	294	44	3	78.8	857	-	-	14	134	277	371	61
	Percent	-	100.	3.4	11.3	20.7	24.8	34.3	5.1	.4	-	100.	-	-	1.6	15.6	32.3	43.2	6.3
	0-5	58.6	77	5	16	19	20	17	-	-	74.4	77	-	-	2	21	33	21	-
	6-18	65.6	265	8	34	54	59	98	21	1	79.8	265	-	-	2	38	75	129	21
	19-40	64.3	369	13	40	79	83	133	19	2	79.3	369	-	-	3	58	114	162	32
	41-60	64.5	133	1	15	23	48	42	4	-	78.4	133	-	-	5	14	52	54	8
	61	58.8	13	2	2	2	3	4	-	-	73.4	13	-	-	2	3	3	5	-
Agriculture	Total																		
	Percent																		
	0-5																		
	6-18																		
	19-40																		
	41-60																		
	61																		
Trades	Total																		
	Percent																		
	0-5																		
	6-18																		
	19-40																		
	41-60																		
	61																		
School	Total	64.1	382	5	43	93	93	135	12	1	78.3	382	-	-	1	56	151	161	13
	Percent	-	100.	1.3	11.3	24.3	24.3	35.3	3.2	.3	-	100.	-	-	.3	14.7	39.5	42.1	3.4
	0-5	75.	1	-	-	-	-	1	-	-	85.	1	-	-	-	-	-	1	-
	6-18	64.1	381	5	43	93	93	134	12	1	78.3	381	-	-	1	56	151	160	13

Homoglobin before Treatment and after Cure
By Occupation, Sex and Age

Table No. 41

Occupation	AGE GROUPS	HEMOGLOBIN SCALE																	
		ALL CASES									ALL CASES								
		Before Treatment									After Cure								
		Index	Total	30-39	40-49	50-59	60-69	70-79	80-89	90 +	Index	Total	30-39	40-49	50-59	60-69	70-79	80-89	90 +
Total	Total	50.7	519	12	233	245	21	8			68.8	519			23	298	181	17	
	Percent	-	100.	2.3	44.8	47.2	4.	1.7			-	100.			4.4	57.4	34.8	3.4	
	0-5	49.	40	-	25	14	1	-			67.	40			4	24	12	-	
	6-18	50.9	234	4	103	115	8	4			69.	234			7	132	89	6	
	19-40	50.8	171	5	76	78	8	4			69.3	171			4	104	54	9	
	41-60	51.4	62	1	24	33	4	-			68.3	62			6	31	23	2	
	61 +	47.5	12	2	5	5	-	-			65.8	12			2	7	3	-	
Dmoestic	Total	49.8	179	7	87	78	6	1			67.9	179			14	103	57	5	
	Percent	-	100.	3.9	48.6	43.5	3.5	.5			-	100.			7.8	57.5	31.8	2.9	
	0-5	49.1	39	-	24	14	1	-			67.	39			4	23	12	-	
	6-18	50.2	36	-	19	16	-	1			67.7	36			2	22	12	-	
	19-40	50.	73	4	30	37	2	-			69.7	73			2	46	21	4	
	41-60	50.3	26	1	13	9	3	-			68.4	26			4	10	11	1	
	61 +	45.	5	2	1	2	-	-			63.	5			2	2	1	-	
Agriculture	Total	51.2	160	1	71	78	7	3			68.5	160			3	102	50	5	
	Percent	-	100.	.6	44.3	48.8	4.4	1.9			-	100.			1.9	63.7	31.2	3.2	
	0-5	-	-	-	-	-	-	-			-	-			-	-	-	-	
	6-18	50.3	30	-	15	14	1	-			68.	30			-	21	9	-	
	19-40	51.3	91	1	43	39	5	3			68.8	91			2	56	29	4	
	41-60	52.5	32	-	9	22	1	-			68.4	32			1	20	10	1	
	61 +	49.3	7	-	4	3	-	-			68.	7			-	5	2	-	
Trades	Total	53.3	12	-	5	5	1	1			72.8	12			1	3	7	1	
	Percent	-	100.	-	41.7	41.7	8.3	8.3			-	100.			8.3	25.	58.4	8.3	
	0-5	-	-	-	-	-	-	-			-	-			-	-	-	-	
	6-18	55.	1	-	-	1	-	-			75.	1			-	-	1	-	
	19-40	55.	7	-	3	2	1	1			73.6	7			-	2	4	1	
	41-60	50.	4	-	2	2	-	-			67.5	4			1	1	2	-	
	61 +	-	-	-	-	-	-	-			-	-			-	-	-	-	
School	Total	51.1	168	4	70	84	7	3			69.3	168			6	89	67	6	
	Percent	-	100.	2.4	41.7	50.	4.2	1.7			-	100.			3.6	53.	39.8	3.6	
	0-5	45.	1	-	1	-	-	-			65.	1			-	1	-	-	
	6-18	51.2	167	4	69	84	7	3			69.4	167			6	88	67	6	

Hookworm Cases
MALARIAL ZONES
Hemoglobin before Treatment and after Cure
By Occupation, Sex and Age.

Table No. 42

Occupation	AGE GROUPS	HEMOGLOBIN SCALE																	
		MALE									MALE								
		Before Treatment									After Cure								
		Index	Total	30-39	40-49	50-59	60-69	70-79	80-89	90 +	Index	Total	30-39	40-49	50-59	60-69	70-79	80-89	90 +
Total	Total	50.7	280	5	128	131	12	4			68.6	280			11	165	97	7	
	Percent	-	100.	1.7	45.7	46.7	4.3	1.6			-	100.			3.9	58.9	34.6	2.6	
	0-5	48.3	18	-	12	6	-	-			66.6	18			2	11	5	-	
	6-18	50.3	119	3	55	56	5	-			68.6	119			4	69	45	1	
	19-40	51.4	100	2	46	42	6	4			69.	100			3	59	33	5	
	41-60	52.2	36	-	11	24	1	-			68.3	36			2	21	12	1	
	61 +	49.5	7	-	4	3	-	-			68.5	7			-	5	2	-	
Domestic	Total	48.5	20	1	11	8	-	-			66.	20			3	12	5	-	
	Percent	-	100.	5.	55.	40.	-	-			-	100.			15.	60.	25.	-	
	0-5	48.5	17	-	11	6	-	-			66.8	17			2	10	5	-	
	6-18	55.	1	-	-	1	-	-			65.	1			-	1	-	-	
	19-40	45.	2	1	-	1	-	-			60.	2			1	1	-	-	
	41-60	-	-	-	-	-	-	-			-	-			-	-	-	-	
	61 +	-	-	-	-	-	-	-			-	-			-	-	-	-	
Agriculture	Total	51.2	160	1	71	78	7	3			68.5	160			3	102	50	5	
	Percent	-	100.	.6	44.3	48.8	4.4	1.9			-	100.			1.9	63.7	31.2	3.2	
	0-5	-	-	-	-	-	-	-			-	-			-	-	-	-	
	6-18	50.3	30	-	15	14	1	-			68.	30			-	21	9	-	
	19-40	51.3	91	1	43	39	5	3			68.8	91			2	56	29	4	
	41-60	52.5	32	-	9	22	1	-			68.4	32			1	20	10	1	
	61 +	49.3	7	-	4	3	-	-			68.	7			-	5	2	-	
Trades	Total	53.3	12	-	5	5	1	1			72.8	12			1	3	7	1	
	Percent	-	100.	-	41.7	41.7	8.3	8.3			-	100.			8.3	25.	58.4	8.3	
	0-5	-	-	-	-	-	-	-			-	-			-	-	-	-	
	6-18	55.	1	-	-	1	-	-			75.	1			-	-	1	-	
	19-40	55.	7	-	3	2	1	1			73.6	7			-	2	4	1	
	41-60	50.	4	-	2	2	-	-			67.5	4			1	1	2	-	
	61 +	-	-	-	-	-	-	-			-	-			-	-	-	-	
School	Total	50.	88	3	41	40	4	-			68.6	88			5	47	35	1	
	Percent	-	100.	3.4	46.7	45.4	4.5	-			-	100.			5.7	53.4	39.8	1.1	
	0-5	45.	1	-	1	-	-	-			65.	1			-	1	-	-	
	6-18	50.1	87	3	40	40	4	-			68.6	87			5	46	35	1	

Hookworm Cases
MALARIAL ZONES
Hemoglobin before Treatment and after Cure

Table No. 43

By Occupation, Sex and Age

Occupation	AGE GROUPS	HEMOGLOBIN SCALE																	
		FEMALE									FEMALE								
		Before Treatment									After Cure								
		Index	Total	30-39	40-49	50-59	60-69	70-79	80-89	90 +	Index	Total	30-39	40-49	50-59	60-69	70-79	80-89	90 +
Total	Total	50.7	239	7	103	114	9	4			68.8	239			12	133	84	10	
	Percent	-	100.	2.9	43.9	47.6	3.7	1.9			-	100.			5.	55.6	35.1	4.3	
	0-5	49.1	22	-	13	8	1	-			67.3	22			2	13	7	-	
	6-18	51.6	115	1	48	59	3	4			69.4	115			3	63	44	5	
	19-40	50.2	71	3	30	36	2	-			68.9	71			1	45	21	4	
	41-60	50.3	26	1	13	9	3	-			68.4	26			4	10	11	1	
	61 +	45.	5	2	1	2	-	-			63.	5			2	2	1	-	
Domestic	Total	49.9	159	6	76	70	6	1			68.2	159			11	91	52	5	
	Percent	-	100.	3.8	47.8	44.1	3.8	.5			-	100.			6.9	57.2	32.7	3.2	
	0-5	49.5	22	-	13	8	1	-			67.3	22			2	13	7	-	
	6-18	50.1	35	-	19	15	-	1			67.8	35			2	21	12	-	
	19-40	50.2	71	3	30	36	2	-			68.9	71			1	45	21	4	
	41-60	50.4	26	1	13	9	3	-			68.4	26			4	10	11	1	
	61 +	45.	5	2	1	2	-	-			63.	5			2	2	1	-	
Agriculture	Total																		
	Percent																		
	0-5																		
	6-18																		
	19-40																		
	41-60																		
	61																		
Trades	Total																		
	Percent																		
	0-5																		
	6-18																		
	19-40																		
	41-60																		
	61																		
School	Total	52.2	80	1	29	44	3	3			70.1	80			1	42	32	5	
	Percent	-	100.	1.2	36.4	55.	3.7	3.7			-	100.			1.2	52.6	40.	6.2	
	0-5	-	-	-	-	-	-	-			-	-							
	6-18	52.2	80	1	29	44	3	3			70.1	80			1	42	32	5	

Hookworm Cases
NON-MALARIAL ZONES
Hemoglobin before Treatment and After Cure.
By Occupation, Sex and Age.

Table No. 44

Occupation	AGE GROUPS	HEMOGLOBIN									SCALE								
		ALL CASES									ALL CASES								
		Before Treatment									After Cure								
		Index	Total	30-39	40-49	50-59	60-69	70-79	80-89	90 +	Index	Total	30-39	40-49	50-59	60-69	70-79	80-89	90 +
Total	Total	67.9	2086	51	70	324	591	877	153	20	81.3	2086	-	1	5	117	701	1079	183
	Percent	-	100.	2.4	3.3	15.5	28.3	42.2	7.3	1.	-	100	-	-	.3	5.6	33.6	51.7	8.8
	0-5	60.8	103	8	8	22	31	32	2	-	77.6	103	-	-	-	17	44	40	2
	6-18	67.4	1036	25	36	176	296	440	58	5	80.7	1036	-	-	2	61	376	534	63
	19-40	69.4	675	15	18	91	178	291	67	15	82.6	675	-	-	2	30	190	359	94
	41-60	68.9	237	3	7	29	77	98	23	-	81.6	237	-	1	1	8	78	128	21
	61 +	69.	35	-	1	6	9	16	3	-	81.5	35	-	-	-	1	13	18	3
Domestic	Total	66.1	767	29	27	118	226	316	48	3	81.1	767	-	-	3	54	248	396	66
	Percent	-	100	3.8	3.5	15.3	29.4	41.2	6.3	.5	-	100.	-	-	.5	7.	32.3	51.6	8.6
	0-5	60.6	102	8	8	22	31	31	2	-	77.5	102	-	-	-	17	44	39	2
	6-18	67.7	240	11	5	39	62	99	23	1	81.6	240	-	-	-	19	66	132	23
	19-40	67.7	307	10	11	43	84	138	19	2	81.9	307	-	-	2	13	94	165	33
	41-60	68.	110	-	2	14	46	44	4	-	80.9	110	-	-	1	4	42	55	8
	61 +	67.5	8	-	1	-	3	4	-	-	80.	8	-	-	-	1	2	5	-
Agriculture	Total	70.	658	10	17	86	160	291	79	15	82.7	658	-	1	2	26	177	360	92
	Percent	-	100	1.5	2.6	13.1	24.3	44.2	12.	2.3	-	100.	-	.1	.3	4.	26.9	54.7	14.
	0-5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6-18	69.9	153	3	5	18	31	82	11	3	82.6	153	-	-	2	5	37	93	16
	19-40	70.5	356	5	7	47	93	146	46	12	83.	356	-	-	-	17	94	185	60
	41-60	69.7	122	2	5	15	30	51	19	-	82.2	122	-	1	-	4	35	69	13
	61 +	69.4	27	-	-	6	6	12	3	-	82.	27	-	-	-	-	11	13	3
Trades	Total	72.1	21	1	-	1	4	12	2	1	83.6	21	-	-	-	-	4	16	1
	Percent	-	100.	4.7	-	4.7	19.2	57.1	9.6	4.7	-	100.	-	-	-	-	18.8	76.5	4.7
	0-5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6-18	70.	4	-	-	-	2	2	-	-	82.5	4	-	-	-	-	1	3	-
	19-40	75.9	12	-	-	1	1	7	2	1	84.2	12	-	-	-	-	2	9	1
	41-60	65.	5	1	-	-	1	3	-	-	83.	5	-	-	-	-	1	4	-
	61 +	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
School	Total	66.6	640	11	26	119	201	258	24	1	79.9	640	-	-	-	37	272	307	24
	Percent	-	100.	1.7	4.1	18.6	31.4	40.3	3.8	.1	-	100	-	-	-	5.8	42.5	47.9	3.8
	0-5	75.	1	-	-	-	-	1	-	-	85.	1	-	-	-	-	-	1	-
	6-18	66.6	639	11	26	119	201	257	24	1	79.9	639	-	-	-	37	272	306	24

Hookworm Cases

NON-MALARIAL ZONES

Table No. 45

Hemoglobin before Treatment and After Cure
By Occupation, Sex and Age.

Occupation	AGE GROUPS	HEMOGLOBIN SCALE																	
		MALE									MALE								
		Before Treatment									After Cure								
		Index	Total	30-39	40-49	50-59	60-69	70-79	80-89	90 +	Index	Total	30-39	40-49	50-59	60-69	70-79	80-89	90 +
Total	Total	68.3	1086	24	35	168	294	452	97	16	81.5	1086	-	1	2	60	357	557	109
	Percent	-	100.	2.2	3.2	15.4	27.	41.6	8.9	1.7	-	100.	-	.1	.2	5.5	32.9	51.3	10.
	0-5	58.8	47	3	5	11	12	14	2	-	77.7	47	-	-	-	9	18	18	2
	6-18	67.1	505	13	17	88	147	212	25	3	80.4	505	-	-	2	30	194	250	29
	19-40	70.6	377	5	8	48	97	158	48	13	83.1	377	-	-	-	17	97	201	62
	41-60	70.	130	3	5	15	32	56	19	-	82.2	130	-	1	-	4	37	75	13
	61 +	69.4	27	-	-	6	6	12	3	-	82.	27	-	-	-	-	11	13	3
Domestic	Total	61.	69	6	6	11	19	23	4	-	79.2	69	-	-	-	11	23	30	5
	Percent	-	100.	8.7	8.7	15.9	27.6	33.3	5.8	-	-	100.	-	-	-	15.9	33.3	43.6	7.2
	0-5	58.8	47	3	5	11	12	14	2	-	77.7	47	-	-	-	9	18	18	2
	6-18	62.	10	3	-	-	3	2	2	-	80.	10	-	-	-	2	3	3	2
	19-40	68.3	9	-	1	-	3	5	-	-	85.	9	-	-	-	-	1	7	1
	41-60	71.6	3	-	-	-	1	2	-	-	81.6	3	-	-	-	-	1	2	-
	61 +	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Agriculture	Total	70.	658	10	17	86	160	291	79	15	82.7	658	-	1	2	26	177	360	92
	Percent	-	100.	1.5	2.6	13.1	24.3	44.2	12.	2.3	-	100.	-	.1	.3	3.9	26.9	54.8	14.
	0-5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6-18	69.9	153	3	5	18	31	82	11	3	82.6	153	-	-	2	5	37	93	16
	19-40	70.5	356	5	7	47	93	146	46	12	83.	356	-	-	-	17	94	185	60
	41-60	69.7	122	2	5	15	30	51	19	-	82.2	122	-	1	-	4	35	69	13
	61 +	69.4	27	-	-	6	6	12	3	-	82.	27	-	-	-	-	11	13	3
Trades	Total	72.1	21	1	-	1	4	12	2	1	83.6	21	-	-	-	-	4	16	1
	Percent	-	100.	4.7	-	4.7	19.2	57.1	9.6	4.7	-	100.	-	-	-	-	19.	76.3	4.7
	0-5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6-18	70.	4	-	-	-	2	2	-	-	82.5	4	-	-	-	-	1	3	-
	19-40	75.9	12	-	-	1	1	7	2	1	84.2	12	-	-	-	-	2	9	1
	41-60	65.	5	1	-	-	1	3	-	-	83.	5	-	-	-	-	1	4	-
	61 +	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
School	Total	66.	338	7	12	70	111	126	12	-	79.4	338	-	-	-	23	153	151	11
	Percent	-	100.	2.1	3.5	20.8	32.8	37.3	3.5	-	-	100.	-	-	-	6.8	45.3	44.7	3.2
	0-5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6-18	66.	338	7	12	70	111	126	12	-	79.4	338	-	-	-	23	153	151	11

Hookworm Cases
NON-MALARIAL ZONES
Hemoglobin before Treatment and After Cure
By Occupation, Sex and Age.

Table No. 46

Occupation	AGE GROUPS	HEMOGLOBIN SCALE																	
		FEMALE									FEMALE								
		Before Treatment									After Cure								
		Index	Total	30-39	40-49	50-59	60-69	70-79	80-89	90 +	Index	Total	30-39	40-49	50-59	60-69	70-79	80-89	90 +
Total	Total	66.9	1000	27	35	156	297	425	56	4	81.1	1000	-	-	3	57	344	522	74
	Percent	-	100.	2.7	3.5	15.6	29.7	42.5	5.6	.4	-	100.	-	-	.3	5.7	34.4	52.2	7.4
	0-5	62.5	56	5	3	11	19	18	-	-	77.5	56	-	-	-	8	26	22	-
	6-18	67.6	531	12	19	88	149	228	33	2	81.	531	-	-	-	31	182	234	34
	19-40	67.7	298	10	10	43	81	133	19	2	81,8	298	-	-	2	13	93	158	32
	41-60	67.9	107	-	2	14	45	42	4	-	80.8	107	-	-	1	4	41	53	8
	61 +	67.5	8	-	1	-	3	4	-	-	80.	8	-	-	-	1	2	5	-
Domestic	Total	66.8	698	23	21	107	207	293	44	3	81.2	698	-	-	3	43	225	366	61
	Percent	-	100.	3.3	3.	15.3	29.5	42.	6.3	.6	-	100.	-	-	.5	6.2	32.2	52.4	8.7
	0-5	62.2	55	5	3	11	19	17	-	-	77.3	55	-	-	-	8	26	21	-
	6-18	68.	230	8	5	39	59	97	21	1	81.6	230	-	-	-	17	63	129	21
	19-40	67.7	298	10	10	43	81	133	19	2	81.8	298	-	-	2	13	93	158	32
	41-60	67.9	107	-	2	14	45	42	4	-	80.8	107	-	-	1	4	41	53	8
	61 +	67.5	8	-	1	-	3	4	-	-	80.	8	-	-	-	1	2	5	-
Agriculture	Total																		
	Percent																		
	0-5																		
	6-13																		
	19-40																		
	41-60																		
	61 +																		
Trades	Total																		
	Percent																		
	0-5																		
	6-18																		
	19-40																		
	41-60																		
	61 +																		
School	Total	67.3	302	4	14	49	90	132	12	1	80.5	302	-	-	-	14	119	156	13
	Percent	-	100.	1.3	4.6	16.3	29.9	43.7	3.9	.3	-	100.	-	-	-	4.6	39.5	51.6	4.3
	0-5	75.	1	-	-	-	-	1	-	-	85.	1	-	-	-	-	-	1	-
	6-18	67.2	301	4	14	49	90	131	12	1	80.5	301	-	-	-	14	119	155	13

Hookworm Cases

Hemoglobin before Treatment

By Occupation, Sex and Age.

Table No. 47

Occupation	AGE GROUPS	HEMOGLOBIN									SCALE								
		MALARIAL									NON-MALARIAL								
		ALL CASES									ALL CASES								
		In-dex	To-tal	30-39	40-49	50-59	60-69	70-79	80-89	90	In-dex	To-tal	30-39	40-49	50-59	60-69	70-79	80-89	90
Total	Total	50.7	519	12	233	245	21	8			67.9	2086	51	70	324	591	877	153	20
	Percent	-	100.	2.3	44.8	47.2	4.	1.7			-	100.	2.4	3.3	15.5	28.3	42.2	7.3	1.
	0-5	49.	40	-	25	14	1	-			60.8	103	8	8	22	31	32	2	-
	6-18	50.9	234	4	103	115	8	4			67.4	1036	25	36	176	296	440	58	5
	19-40	50.8	171	5	76	78	8	4			69.4	675	15	18	91	178	291	67	15
	41-60	51.4	62	1	24	33	4	-			68.9	237	3	7	29	77	98	23	-
	61	47.5	12	2	5	5	-	-			69.	35	-	1	6	9	16	3	-
Domestic	Total	49.8	179	7	87	78	6	1			66.1	767	29	27	118	226	316	48	3
	Percent	-	100.	3.9	48.6	43.5	3.5	.5			-	100.	3.8	3.5	15.3	29.4	41.2	6.5	.5
	0-5	49.1	39	-	24	14	1	-			60.6	102	8	8	22	31	31	2	-
	6-18	50.2	36	-	19	16	-	1			67.7	240	11	5	39	62	99	23	1
	19-40	50.	73	4	30	37	2	-			67.7	370	10	11	43	84	138	19	2
	41-60	50.3	26	1	13	9	3	-			68.	110	-	2	14	46	44	4	-
	61	45.	5	2	1	2	-	-			67.5	8	-	1	-	3	4	-	-
Agriculture	Total	51.2	160	1	71	78	7	3			70.	658	10	17	86	160	291	79	15
	Percent	-	100.	.6	44.3	48.8	4.4	1.9			-	100.	1.5	2.6	13.1	24.3	44.2	12.	2.3
	0-5	-	-	-	-	-	-	-			-	-	-	-	-	-	-	-	-
	6-18	50.3	30	-	15	14	1	-			69.9	153	3	5	18	31	82	11	3
	19-40	51.3	91	1	43	39	5	3			70.5	356	5	7	47	93	146	46	12
	41-60	52.5	32	-	9	22	1	-			69.7	122	2	5	15	30	51	19	-
	61	49.3	7	-	4	3	-	-			69.4	27	-	-	6	6	12	3	-
Trades	Total	53.3	12	-	5	5	1	1			72.1	21	1	-	1	4	12	2	1
	Percent	-	100	-	41.7	41.7	8.3	8.3			-	100.	4.7	-	4.7	19.2	57.1	9.6	4.7
	0-5	-	-	-	-	-	-	-			-	-	-	-	-	-	-	-	-
	6-18	55.	1	-	-	1	-	-			70.	4	-	-	-	2	2	-	-
	19-40	55.	7	-	3	2	1	1			75.9	12	-	-	1	1	7	2	1
	41-60	50.	4	-	2	2	-	-			65.	5	1	-	-	1	3	-	-
	61	-	-	-	-	-	-	-			-	-	-	-	-	-	-	-	-
School	Total	51.1	168	4	70	84	7	3			66.6	640	11	26	119	201	258	24	1
	Percent	-	100.	2.4	41.7	50.	4.2	1.7			-	100.	1.7	4.1	18.6	31.4	40.3	3.8	.1
	0-5	45.	1	-	1	-	-	-			75.	1	-	-	-	-	1	-	-
	6-18	51.3	167	4	69	84	7	3			66.6	639	11	26	119	201	257	24	1

Hookworm Cases
Hemoglobin before Treatment
By Occupation, Sex and Age.

Table No. 48

Occupation	AGE GROUPS	HEMOGLOBIN SCALE																	
		MALARIAL									NON-MALARIAL								
		MALE									MALE								
		Index	Total	30-39	40-49	50-59	60-69	70-79	80-89	90	Index	Total	30-39	40-49	50-59	60-69	70-79	80-89	90
Total	Total	50.7	280	5	128	131	12	4			68.3	1086	24	35	168	294	452	97	16
	Percent	-	100.	1.7	45.7	46.7	4.3	1.6			-	100.	2.2	3.2	15.4	27.	41.6	8.9	1.7
	0-5	48.3	18	-	12	6	-	-			58.8	47	3	5	11	12	14	2	-
	6-18	50.3	119	3	55	56	5	-			67.1	505	13	17	88	147	212	25	3
	19-40	51.4	100	2	46	42	6	4			70.6	377	5	8	48	97	158	48	13
	40-60	52.2	36	-	11	24	1	-			70.	130	3	5	15	32	56	19	-
	61	49,5	7	-	4	3	-	-			69.4	27	-	-	6	6	12	3	-
Domestic	Total	48.5	20	1	11	8	-	-			61.	69	6	6	11	19	23	4	-
	Percent	-	100.	5.	55.	40.	-	-			-	100.	8.7	8.7	15.9	27.6	33.3	5.8	-
	0-5	48.5	17	-	11	6	-	-			58.8	47	3	5	11	12	14	2	-
	6-18	55.	1	-	-	1	-	-			62.	10	3	-	-	3	2	2	-
	19-40	45.	2	1	-	1	-	-			68.3	9	-	1	-	3	5	-	-
	41-60	-	-	-	-	-	-	-			71.6	3	-	-	-	1	2	-	-
	61	-	-	-	-	-	-	-			-	-	-	-	-	-	-	-	-
Agriculture	Total	51.2	160	1	71	78	7	3			70.	658	10	17	86	160	291	79	15
	Percent	-	100.	.6	44.3	48.8	4.4	1.9			-	100.	1.5	2.6	13.1	24.3	44.2	12.	2.3
	0-5	-	-	-	-	-	-	-			-	-	-	-	-	-	-	-	-
	6-18	50.3	30	-	15	14	1	-			69.9	153	3	5	18	31	82	11	3
	19-40	51.3	91	1	43	39	5	3			70.5	356	5	7	47	93	146	46	12
	41-60	52.5	32	-	9	22	1	-			69.7	122	2	5	15	30	51	19	-
	61	49.3	7	-	4	3	-	-			69.4	27	-	-	6	6	12	3	-
Trades	Total	53.3	12	-	5	5	1	1			72.1	21	1	-	1	4	12	2	1
	Percent	-	100.	-	41.7	41.7	8.3	8.3			-	100.	4.7	-	4.7	19.2	57.1	9.6	4.7
	0-5	-	-	-	-	-	-	-			-	-	-	-	-	-	-	-	-
	6-18	55.	1	-	-	1	-	-			70.	4	-	-	-	2	2	-	-
	19-40	55.	7	-	3	2	1	1			75.9	12	-	-	1	1	7	2	1
	41-60	50.	4	-	2	2	-	-			65.	5	1	-	-	1	3	-	-
	61	-	-	-	-	-	-	-			-	-	-	-	-	-	-	-	-
School	Total	50.	88	3	41	40	4	-			66.	338	7	12	70	111	126	12	-
	Percent	-	100.	3.4	46.7	45.4	4.5	-			-	100.	2.1	3.5	20.8	32.8	37.3	3.5	-
	0-5	45.	1	-	1	-	-	-			-	-	-	-	-	-	-	-	-
	6-18	50.1	87	3	40	40	4	-			66.	338	7	12	70	111	126	12	-

Hookworm Cases
Hemoglobin before Treatment
By Occupation, Sex and Age.

Table No. 49

Occupation	AGE GROUPS	HEMOGLOBIN SCALE																	
		MALARIAL									NON- MALARIAL								
		FEMALE									FEMALE								
		In-dex	To-tal	30-39	40-49	50-59	60-69	70-79	80-89	90	In-dex	To-tal	30-39	40-49	50-59	60-69	70-79	80-89	90
Total	Total	50.7	239	7	105	114	9	4			66.9	1000	27	35	156	297	425	56	4
	Percent	-	100.	2.9	43.9	47.6	3.7	1.9			-	100.	2.7	3.5	15.6	29.7	42.5	5.6	.4
	0-5	49.1	22	-	13	8	1	-			62.5	56	5	3	11	19	18	-	-
	6-18	51.6	115	1	48	59	3	4			67.6	531	12	19	88	149	228	33	2
	19-40	50.2	71	3	30	36	2	-			67.7	298	10	10	43	81	133	19	2
	41-60	50.3	26	1	13	9	3	-			67.9	107	-	2	14	45	42	4	-
	61	45.	5	2	1	2	-	-			67.5	8	-	1	-	3	4	-	-
Domestic	Total	49.9	159	6	76	70	6	1			66.8	698	23	21	107	207	293	44	3
	Percent	-	100.	3.8	47.8	44.1	3.8	.5			-	100.	3.3	3.	15.3	29.5	42.	6.3	.6
	0-5	49.5	22	-	13	8	1	-			62.2	55	5	3	11	19	17	-	-
	6-18	50.1	35	-	19	15	-	1			68.	230	8	5	39	59	97	21	1
	19-40	50.2	71	3	30	36	2	-			67.7	298	10	10	43	81	133	19	2
	41-60	50.4	26	1	13	9	3	-			67.9	107	-	2	14	45	42	4	-
	61	45.	5	2	1	2	-	-			67.3	8	-	1	-	3	4	-	-
Agriculture	Total																		
	Percent																		
	0-5																		
	6-18																		
	19-40																		
	41-60																		
	61																		
Trades	Total																		
	Percent																		
	0-5																		
	6-18																		
	19-40																		
	41-60																		
	61																		
School	Total	52.2	80	1	29	44	3	3			67.3	302	4	14	49	90	132	12	1
	Percent	-	100.	1.2	36.4	55.	3.7	3.7			-	100.	1.3	4.6	16.3	29.9	43.7	3.9	.3
	0-5	-	-	-	-	-	-	-			75.	1	-	-	-	-	1	-	-
	6-18	52.2	80	1	29	44	3	3			67.2	301	4	14	49	90	131	12	1

Hookworm Cases

Hemoglobin after Cure

By Occupation, Sex and Age.

Table No. 50

Occupation	AGE GROUPS	HEMOGLOBIN SCALE																	
		MALARIAL									NON-MALARIAL								
		ALL CASES									ALL CASES								
		Index	Total	30-39	40-49	50-59	60-69	70-79	80-89	90 +	Index	Total	30-39	40-49	50-59	60-69	70-79	80-89	90 +
Total	Total	68.8	519			23	298	181	17		81.3	2086		1	5	117	701	1074	183
	Percent	–	100			4.4	57.4	34.8	3.4		–	100.		–	.3	5.6	33.6	51.7	8.8
	0-5	67.	40			4	24	12	–		77.6	103		–	–	17	44	40	2
	6-18	69.	234			7	132	89	6		80.7	1036		–	2	61	376	534	63
	19-40	69.3	171			4	104	54	9		82.6	675		–	2	30	190	359	94
	41-60	68.3	62			6	31	23	2		81.6	237		1	1	8	78	128	21
	61 +	65.8	12			2	7	3	–		81.5	35		–	–	1	13	18	3
Domestic	Total	67.9	179			14	103	57	5		81.1	767		–	3	54	248	346	66
	Percent	–	100.			7.8	57.5	31.8	2.9		–	100.		–	.5	7.	32.3	51.6	8.6
	0-5	67.	34			4	23	12	–		77.5	102		–	–	17	44	39	2
	6-18	67.7	36			2	22	12	–		81.6	240		–	–	19	66	132	23
	19-40	68.7	73			2	46	21	4		81.9	307		–	2	13	94	165	33
	41-60	68.4	26			4	10	11	1		80.4	110		–	1	4	42	55	8
	61+	63.	5			2	2	1	–		80.	8		–	–	1	2	5	–
Agriculture	Total	68.5	160			3	102	50	5		82.7	658		1	2	26	177	360	92
	Percent	–	100.			1.9	63.7	31.2	3.2		–	100		.1	.3	4.	26.9	54.7	14.
	0-5	–	–			–	–	–	–		–	–		–	–	–	–	–	–
	6-18	68.	30			–	21	9	–		82.6	153		–	2	5	37	93	16
	19-40	68.8	91			2	56	29	4		83.	356		–	–	17	94	185	60
	41-60	68.4	32			1	20	10	1		82.2	122		1	–	4	35	69	13
	61+	68.	7			–	5	2	–		82.	27		–	–	–	11	13	3
Trades	Total	72.8	12			1	3	7	1		83.6	21		–	–	–	4	16	1
	Percent	–	100.			8.3	25.	58.4	8.3		–	100.		–	–	–	18.8	76.5	4.7
	0-5	–	–			–	–	–	–		–	–		–	–	–	–	–	–
	6-18	75.	1			–	–	1	–		82.5	4		–	–	–	1	3	–
	19-40	73.6	7			–	2	4	1		84.2	12		–	–	–	2	9	1
	41-60	67.5	4			1	1	2	–		83.	5		–	–	–	1	4	–
	61+	–	–			–	–	–	–		–	–		–	–	–	–	–	–
School	Total	69.3	168			6	89	67	6		79.9	640		–	–	37	272	307	24
	Percent	–	100.			3.6	53.	39.8	3.6		–	100.		–	–	5.8	42.5	47.9	3.8
	0-5	65.	1			–	1	–	–		85.	1		–	–	–	–	1	–
	6-18	69.4	167			6	88	67	6		79.9	639		–	–	37	272	306	24

Hookworm Cases

Hemoglobin after Cure.

By Occupation, Sex and Age.

Table No. 51

Occupation	AGE GROUPS	HEMOGLOBIN									SCALE								
		MALARIAL									NON-MALARIAL								
		MALE									MALE								
		Index	Total	30-39	40-49	50-59	60-69	70-79	80-89	90	Index	Total	30-39	40-49	50-59	60-69	70-79	80-89	90
Total	Total	68.	280			11	165	97	7		81.5	1086		1	2	60	357	557	109
	Percent	-	100.			3.9	58.9	34.6	2.6		-	100.		.1	.2	5.5	32.9	51.3	10.
	0-5	66.6	18			2	11	5	-		77.7	47		-	-	9	18	18	2
	6-18	68.6	119			4	69	45	1		80.4	505		-	2	30	194	250	29
	19-40	69.	100			3	59	33	5		83.1	377		-	-	17	97	201	62
	41-60	68.3	36			2	21	12	1		82.2	130		1	-	4	37	75	13
	61	68.5	7			-	5	2	-		82.	27		-	-	-	11	13	3
Domestic	Total	66.	20			3	12	5	-		79.2	69		-	-	11	23	30	5
	Percent	-	100.			15.	60.	25.	-		-	100.		-	-	15.9	33.3	43.6	7.2
	0-5	66.8	17			2	10	5	-		77.7	47		-	-	9	18	18	2
	6-18	65.	1			-	1	-	-		80.	10		-	-	2	3	3	2
	19-40	60.	2			1	1	-	-		85.	9		-	-	-	1	7	1
	41-60	-	-			-	-	-	-		81.6	3		-	-	-	1	2	-
	61	-	-			-	-	-	-		-	-		-	-	-	-	-	-
Agriculture	Total	68.5	160			3	102	50	5		82.7	658		1	2	26	177	360	92
	Percent	-	100.			1.9	63.7	31.2	3.2		-	100.		.1	.3	3.9	26.9	54.8	14.
	0-5	-	-			-	-	-	-		-	-	-	-	-	-	-	-	-
	6-18	68.	30			-	21	9	-		82.6	153		-	2	5	37	93	16
	19-40	68.8	91			2	56	29	4		83.	356		-	-	17	94	185	60
	41-60	68.4	32			1	20	10	1		82.2	122		1	-	4	35	69	13
	61	68.	7			-	5	2	-		82.	27		-	-	-	11	13	3
Trades	Total	72.8	12			1	3	7	1		83.6	21		-	-	-	4	16	1
	Percent	-	100.			8.3	25.	58.4	8.3		-	100.		-	-	-	19.	76.3	4.7
	0-5	-	-			-	-	-	-		-	-		-	-	-	-	-	-
	6-18	75.	1			-	-	1	-		82.5	4		-	-	-	1	3	-
	19-40	73.6	7			-	2	4	1		84.2	12		-	-	-	2	9	1
	41-60	67.5	4			1	1	2	-		83.	5		-	-	-	1	4	-
	61	-	-			-	-	-	-		-	-		-	-	-	-	-	-
School	Total	68.6	88			5	47	35	1		79.4	338				23	153	151	11
	Percent	-	100.			5.7	53.4	39.8	1.1		-	100.				6.8	45.3	44.7	3.2
	0-5	65.	1			-	1	-	-		-	-		-	-	-	-	-	-
	6-18	68.6	87			5	46	35	1		79.4	338				23	153	151	3.2

Hookworm Cases

Hemoglobin after Cure

By Occupation, Sex and Age.

Table No. 52

Occupation	AGE GROUPS	HEMOGLOBIN SCALE																	
		MALARIAL									NON-MALARIAL								
		FEMALE									FEMALE								
		Index	Total	30-39	40-49	50-59	60-69	70-79	80-89	90	Index	Total	30-39	40-49	50-59	60-69	70-79	80-89	90
Total	Total	68.8	239			12	133	84	10		81.1	1000			3	57	344	522	74
	Percent	-	100.			5.	55.6	35.1	4.3		-	100.			.3	5.7	344	522	7.4
	0-5	67.3	22			2	13	7	-		77.5	56			-	8	26	22	-
	6-18	69.4	115			3	63	44	5		81.	531			-	31	182	284	34
	19-40	68.9	71			1	45	21	4		81.8	298			2	13	93	158	32
	41-60	68.4	26			4	10	11	1		80.8	107			1	4	41	53	8
	61	63.	5			2	2	1	-		80.	8			-	1	2	5	-
Domestic	Total	68.2	159			11	91	52	5		81.2	698			3	43	225	366	61
	Percent	-	100.			6.9	57.2	32.7	3.2		-	100.			.5	6.2	322	524	8.7
	0-5	67.3	22			2	13	7	-		77.3	55			-	8	26	21	-
	6-18	67.8	35			2	21	12	-		81.6	230			-	17	63	129	21
	19-40	68.9	71			1	45	21	4		81.8	298			2	13	93	158	32
	41-60	68.4	26			4	10	11	1		80.8	107			1	4	41	53	8
	61	63.	5			2	2	1	-		80.	8			-	1	2	5	-
Agriculture	Total																		
	Percent																		
	0-5																		
	6-18																		
	19-40																		
	41-60																		
	61																		
Trades	Total																		
	Percent																		
	0-5																		
	6-18																		
	19-40																		
	41-60																		
	61																		
School	Total	70.1	80			1	42	32	5		80.5	302			-	14	119	156	13
	Percent	-	100.			1.2	52.6	40.	6.2		-	100.			-	4.6	39.5	51.6	4.3
	0-5										85.	1			-	-	-	1	-
	6-18	70.1	80			1	42	32	5		80.5	301				14	119	155	13